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FOREWORD

This report examines principles for determining the most appropriate models for investment in surface transport infrastructure. The primary focus is on network-based infrastructure – roads, rail and, to a lesser extent, inland waterways.

The extent and quality of transport infrastructure is of profound importance for the functioning of society and the economy. All governments are faced with the challenge of maintaining vast transport infrastructure networks, and adding new capacity in strategic areas. This requires very large investments.

In the context of intense competition for public resources from other policy priorities, governments are looking to a wider range of models for the delivery of surface transport infrastructure, many of which are characterised by increasing use of private sector resources, expertise and/or management practices. The full set of options considered in this report includes public ministries and agencies, fully or partially state-owned companies, private not-for-profit companies, public-private partnerships (PPPs), and outright privatisation.

As an important point of departure for the analysis, it is argued that the pursuit of efficiency should be at the core of the decision regarding which model to employ. Pursuing efficiencies through the introduction of market forces and private sector practices is complicated by the potential for infrastructure operators to exploit monopoly rents. Care must be taken to ensure that the provision of infrastructure serves society's wider needs.

Achieving the right balance is at the heart of the ongoing debate over how best to provide surface transport infrastructure. All of the models have their benefits and costs. While government ministries allow for the highest degree of accountability, their short-term budgeting, diffuse mandates, bureaucratic processes, and susceptibility to political interference in operational questions can reduce the focus on efficiency in decision-making. Complete privatisation of surface transport infrastructure assets is only applicable under certain circumstances, and creates a need for more proactive government regulation. A range of intermediate arrangements exists.

Public-private partnerships (PPPs) have attracted much attention in recent years. Appropriately designed, PPPs have the potential to allow for important efficiency gains by transferring the responsibility for long-term cost management to private organisations that are intrinsically motivated to reduce overall costs in pursuit of profits, including by way of innovation. But PPPs are complex arrangements, with many pitfalls. Much surface transport infrastructure does not lend itself to PPPs, so the true role for these instruments in the overall system has to be carefully defined.

Governments are faced with a complicated set of options for investing in infrastructure. In all likelihood, different elements of the surface transport system will employ different models, including various degrees of user charging. One of the greatest challenges is in ensuring consistency across the system.

This report begins in Part I with a discussion of the overall challenge of providing surface transport infrastructure, including a description of the available models. It also provides an overview of the current situation observed around the world.

Part II discusses the fundamental question of how borrowing for the creation of surface transport infrastructure should be treated in public accounts.

Part III considers the potential benefits of using different models for the provision of infrastructure. It begins with a discussion of the concept of efficiency. It then looks at potential efficiency gains provided by the models, and fundamental conditions that must be in place to achieve these, as well as inherent and potential costs. This includes consideration of the question of risk transfer. Finally it examines the extent to which users should be expected to pay for infrastructure, and the potential impacts of this on efficiency.

Part IV looks at key questions related to the design of PPPs, particularly their legal and regulatory frameworks and procurement processes.

The Annex provides a series of case studies intended to highlight points raised in the report, and to reveal the complexity of applying principles to real-life infrastructure investment situations.

Overall conclusions are summarised at the beginning of the report.

The report was prepared under the aegis of the Joint Transport Research Centre of the Organisation for Economic Co-operation and Development (OECD) and the International Transport Forum. It is based on research by a working group of experts from 19 countries, chaired by Dr. Urban Karlström, Director General of the Swedish National Road and Transport Research Institute. Working group members are listed at the end of the report.

ABSTRACT
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Governments are faced with a complicated set of options for investing in infrastructure. This report examines principles for determining the most appropriate models for investment in surface transport infrastructure.

In Part I, the report discusses the overall challenge of providing surface transport infrastructure. Chapter 1 looks at the frameworks for the provision and finance of infrastructure and chapter 2 reviews international experiences.

Part II discusses the fundamental question of how borrowing for the creation of surface transport infrastructure should be treated in public accounts. It includes a review of infrastructure investment and budget treatment in chapter 3.

Part III considers the potential benefits of using different models for the provision of infrastructure. It begins with a discussion of the concept of efficiency (chapter 4). It then looks at potential efficiency gains provided by the models (chapter 5), and fundamental conditions that must be in place to achieve these, as well as inherent and potential costs. This includes consideration of the question of risk transfer (chapter 6). Finally it examines the extent to which users should be expected to pay for infrastructure, and the potential impacts of this on efficiency (chapter 7).

Part IV looks at key questions related to the design of PPPs, particularly their legal and regulatory frameworks (chapter 8) and procurement and quality control processes (chapter 9)

The Annex provides a series of case studies intended to highlight points raised in the report, and to reveal the complexity of applying principles to real-life infrastructure investment situations.

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KEY MESSAGES

Alternatives for the provision of surface transport infrastructure

All governments are faced with the challenge of maintaining surface transport infrastructure networks and adding new capacity in strategic areas. This requires very large expenditures.

To meet this demand, governments are increasingly looking to a wide range of alternative models characterised by increasing use of private sector resources, expertise or management. Options include the selective contracting out of specific tasks; public-private partnerships (PPPs); fully or partially state-owned companies; private, not-for-profit entities; and outright privatisation.

Efficiency should be the key

The primary reason for choosing any specific model for the provision of surface transport infrastructure should be to increase efficiency. Efficiency refers to ensuring that projects are carried out when the social benefits of doing so, calculated over the lifetime of the asset, exceed the costs, and that they are built in the way that provides the greatest outputs for money spent. Thus, the injection of private resources is useful to the extent that it serves to overcome inefficiencies in public models of infrastructure provision. Such inefficiencies include, above all, the short-term budgeting processes employed by governments, which limit the resources available and the options for life-cycle cost management.

Private financing does not generate "new money"

Ultimately, most infrastructure must be paid for by some combination of users and taxpayers. While innovative financing models may access new sources of borrowing – which can be useful in bringing infrastructure on stream more quickly – they will not create new funding sources per se. Moreover, the additional costs of private borrowing must be offset by efficiency gains.

Moving expenditures off the public balance sheet should not be the only objective

Limitations on deficit spending exist for a reason, namely to provide for long-term growth and stability. Thus, the model for infrastructure provision should not be chosen for the sole purpose of avoiding public debt and deficit limits. There is no inherent link between the budget treatment of investments and economic efficiency, although off-budget mechanisms may, in some cases, be the most efficient.

Public-private partnerships (PPPs) can allow for life-cycle cost management

Public-private partnerships (PPPs) allow for a project to be managed taking into account its full life-cycle costs, transferring responsibilities for both upstream activities – such as design and building – and downstream activities – such as operations and maintenance – to a private company. The PPP model means that the firm is motivated to reduce overall costs – *i.e.* enhance productive efficiency – in order to increase profits, meaning that the profit motive is put to social use.

Cost reductions must not, however, be achieved by compromising quality. Strict quality guidelines are thus required, establishing availability, physical, safety, environmental and other standards. Performance contracting can also be employed, rewarding above-standard, and penalising below-standard delivery. This means that PPPs involve shifting the procurer's focus from how a project is to be built to its ultimate performance.

Competition is a key element in lowering production costs. Procurement processes must be carefully designed to attract a reasonable number of highly qualified bidders, and award contracts on a consistent basis to realistic bids that represent value for money.

Effective risk sharing and management are key elements in PPP success

PPPs inherently involve sharing risks between the public and private partners. Private companies will expect compensation for assuming risks and, in preparing tenders for PPPs, governments should compare the benefits of risk transfer – in terms of efficiency gains – with the additional costs.

Risks should be assigned to the partner best able to manage them. Private partners should take on the risks that result from factors under their control, especially those associated with construction costs, project management and delays. The exact division of risks will be determined by the particularities of the project and the capabilities of the partners.

Failure of a PPP project involving surface transport infrastructure will result in important political and economic costs for the government. This can provide private partners with significant leverage in any renegotiation process. Care must therefore be taken to avoid the unrealistic assignment of risk to private partners. Demand (*i.e.* road use, rail ridership, etc.) is highly susceptible to changes in circumstances that are exogenous to the project, and any transfer of this particular risk must be subject to careful consideration and formulation. Many PPPs have failed, at great public expense, because demand risk was inappropriately assigned to the private partner. Project bids need to be carefully vetted to eliminate those that are based on unrealistic assumptions.

Contracts must be designed to ensure that the consequences of risk transferred under the PPP are truly borne by the private partner and enforced; ultimately this may require insisting that the private partner relinquish the contract and forfeit performance bonds. One means of increasing private partners' commitment is by spreading remuneration for initial construction costs over the life cycle of the project, meaning that any failure will result in the company not being paid substantial amounts of money – this can increase the public sector's bargaining power in any renegotiations, although the additional cost of private borrowing must also be taken into account.

PPPs create new governance challenges

It is essential that PPPs be implemented within the confines of good fiscal management. They often create long-term financial commitments for government, and budget planning processes must be adjusted to take this into account. Otherwise, commitments can be made that prove to be unaffordable over time.

PPPs are highly complex arrangements, which require detailed negotiation with sophisticated private companies both before and during projects. Appropriate competencies are required in the public sector, and the necessary expertise may take a long time to develop.

Solid policy, legal and regulatory frameworks are essential to guide the use of PPPs, and can assist in ensuring that projects are implemented on the basis of specific principles of good governance – such as the pursuit of efficiency.

There is a need for a more advanced debate regarding the role of PPPs

PPPs are a relatively new phenomenon, meaning that there is little ex post analysis available of the full costs and benefits over entire project life cycles. Governments are still learning with regard to the potential and limitations of these models.

Too often, the debate surrounding the use of PPPs has been polarised between those who see the private sector as superior under all circumstances, and those who see any divestiture as a threat to the public good. Similarly, too much stock has been placed in PPPs as a means of resolving budget shortfalls. A more sophisticated debate is required, identifying those projects where PPPs have the potential to add value, while recognising the limitations of private involvement in the provision of surface transport infrastructure. In reality, PPPs will not account for most infrastructure needs, although they may be employed for the creation and operation of significant assets – even countries that are very advanced in the use of these mechanisms see them accounting for little more that 15% of investment. They will not eliminate the need for public investment – most PPPs involve some degree of subsidies. PPPs must be carefully designed and overseen by government. Particular care must be taken to avoid the unrealistic transfer of risks and responsibilities to private partners.

Devolution can bring about improvements by way of specialisation

PPPs are not the only options available for seeking out efficiency improvements. An alternative is to devolve the provision of infrastructure to entities specifically created for the task. The options available – agencies; fully or partially state-owned companies; private, not-for-profit entities; privatisation – involve varying degrees of independence from the political process in decision-making. Unlike PPPs, devolution models do not involve the sharing of risks or contractual arrangements.

The primary benefit of such models – in comparison with direct provision by government ministries – is that they create entities that specialise in the provision of infrastructure. This means that decision-making is not influenced by unrelated priorities and issues, and there is less room for political interference in day-to-day operational decisions. These organisations can employ private sector management structures, and are often highly dependent on user fees and on public borrowing. In cases where entities are not exposed to competition or pressure from shareholders, their overall drive for efficiency is likely to be limited.

Such devolution is widely applied for surface transport infrastructure. Many countries have placed their roads under agencies, or motorway networks under state-owned companies. Rail infrastructure in OECD countries is typically managed by independent bodies, including state companies and outright privatisation. Often, these entities outsource a high degree of their activities to private contractors. Some agencies and state-owned companies also represent the public partner in PPP arrangements.

The extent of user charging is a key factor in overall efficiency

Direct charging for the use of surface transport infrastructure has important consequences for efficiency.

In theory, the most efficient use of infrastructure would be achieved by charging users for the marginal costs they impose. However, where user fees are applied to new infrastructure, this may result in under-usage and more traffic on adjacent, toll-free routes, especially when the rest of the system is not subject to the same user charges. Moreover, marginal cost pricing can result in insufficient revenues to cover the full costs of building new infrastructure. The alternative is to have government subsidise the project using tax revenues, which also has efficiency implications.

There is no intrinsic link between the extent of user charging and any particular model for the provision of infrastructure; PPPs, state-owned companies and other models can involve any blend of user charging and subsidies. Governments must decide on the appropriate balance of user charging versus subsidies as a key, up-front element in designing the model for infrastructure provision.

The role of government remains key, whatever the model.

In devolving or outsourcing infrastructure, government must strike a delicate balance between the pursuit of new efficiencies and the need to oversee the maintenance and development of key public assets. There is an essential role for government no matter what model is employed.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Introduction

The report *Transport Infrastructure Investment: Options for Efficiency* was developed by a group of international experts under the aegis of the Joint Transport Research Centre of the Organisation for Economic Co-operation and Development (OECD) and the International Transport Forum. Its purpose is to examine the elements that should be considered by governments in choosing the appropriate models for the provision of surface transport infrastructure. This includes maintenance of old and investment in new capacity, as well as questions of financing. The primary focus is on roads and rail, and, to a lesser extent, inland waterways.

Debates regarding new developments in the provision of surface transport infrastructure are often reduced to discussions of public-private partnerships (PPPs), and polarised between their supporters and proponents. PPPs are important, and this report examines their potential benefits and limitations, to the extent that these have been revealed by existing experience. At the same time, PPPs are not likely to provide for most infrastructure needs, meaning that a wider range of instruments must be considered, including direct provision by government ministries and agencies, fully and partially state–owned enterprises, private and not-for-profit companies, and outright privatisation.

This report seeks to add value to the discussion by examining the full range of choices available to government when seeking to meet surface transport infrastructure needs.

Providing for surface transport infrastructure needs is a key government responsibility

Surface transport infrastructure has qualities that differentiate it from many other sectors of the economy:

- The availability of transport infrastructure and services is of essential importance to most – if not all – sectors of society and the economy.
- The scale of infrastructure undertakings typically means that a fully competitive market in the sector is extremely difficult to achieve.
- Infrastructure is often a “natural monopoly”, meaning that the costs of its provision are minimised when there is only one facility.
- Once provided, much surface transport infrastructure – especially roads – becomes a public good, inasmuch as it can be consumed up to capacity by many users without affecting the availability of the service to others.
- Transport use results in important externalities that are, at present, seldom fully accounted for in any pricing system.

These qualities make it impossible for government to fully divest itself of the responsibility for providing surface transport infrastructure. If left entirely to market forces, infrastructure would not be

built to the extent that is warranted from an overall social perspective. There is, thus, a need for governments to be engaged in the delivery of transport infrastructure, as well as a public expectation that they will fulfil this role adequately.

This does not mean that all tasks must be carried out by government

The provision of surface transport infrastructure involves many separate tasks, including:

- *Administrative activities*, such as establishing policy frameworks, needs assessments, planning, initial development, tendering and contracting, oversight, regulation, *etc*.
- *Works*, including initial building and/or ongoing maintenance.
- *Operations*, including collecting tolls, traffic management, providing appropriate signage, *etc*.
- *Financing*, meaning providing money at a time and in a quantity needed to ensure an adequate supply of infrastructure to meet society's needs, meeting the costs of all the above-mentioned activities.

Some of the tasks are *sovereign*, in that they are inalienable from government responsibility. Such tasks are associated with protecting the public interest by setting directions, designing models for the provision of infrastructure, and overseeing their functioning. Other tasks are *operational*, meaning that they can potentially be carried out by entities that are independent from direct government control. In addition, some tasks may be carried out by way of co-operation between the public and private sectors, although the former must ultimately control the overall process. Table 1 describes the tasks that fall under these headings.

Table 1. **The Division of Tasks Associated with the Provision of Surface Transport Infrastructure**

Sovereign tasks (state responsibility)	Operational tasks (can be delegated)
• Establishing policy directions.	• Organising private financing for a given initiative.
• Deciding how much public resources should be dedicated to the transport sector, to particular modes, and to specific projects.	• Works (new construction and maintenance).
• Needs assessment (determining the demand for infrastructure).	• Operations (*e.g.* traffic management, toll collection, etc.).
• Choosing and designing models for infrastructure provision.	
• Deciding on the balance of user charging and tax-based subsidies that will be employed.	
• Organising tendering.	
• Designing and negotiating contracts.	
• Creating required legislative and regulatory frameworks.	
• *Ex post* monitoring.	

Governments have many options for how to deliver infrastructure

Various models for the provision of infrastructure can be distinguished from one another by the extent to which the execution of operational tasks remains under direct political control. The highest degree of political control occurs when all the elements in Table 1 are carried out by a government ministry using its own resources. From that point of departure there are two roads towards reducing that control: *outsourcing* and *devolution.*

Outsourcing means that the government retains overall responsibility for the provision of infrastructure, but selectively pays private companies to undertake specific operational tasks over limited periods of time, based on contractual arrangements. There are three levels of outsourcing:

Simple contracting out: At the most basic level, this involves tendering out discrete activities, such as road works or tolling management, on a case-by-case basis.

Design-Build arrangements: A further step involves the transfer of responsibility for designing and building infrastructure, as a single package, to a private partner.

Public-private partnerships (PPPs): The highest level of outsourcing is PPPs. These involve the transfer of extensive responsibility for the designing, building, operation, maintenance and/or financing of infrastructure, as well as associated risks, to private partners over long periods, after which the project is transferred back to government.

Devolution refers to the transfer of responsibility for the provision of infrastructure to entities that exist specifically for that purpose. To a greater or lesser degree, the decision-making processes within these organisations are not under the direct control of elected officials. Different models of devolution include, with increasing degrees of independence:

1. *Government agencies* – Public bodies that report directly to government ministries, but which typically have a more limited set of responsibilities and a higher degree of leeway with regard to operational decisions than a ministry would have. Agencies can be established both for the delivery of works and to manage funds dedicated to infrastructure.

2. *State-owned companies* – Companies that are organised under private company legislation and whose management is largely independent in its decision-making, but which are subject to government control by way of ownership.

3. *Mixed companies* – Companies in which the government maintains an important ownership stake, but where there is also private ownership.

4. *Private, not-for-profit organisations* – Private entities that reinvest net revenues in the infrastructure asset, with management that is responsible before a board that is made up of stakeholders, which could include government.

5. *100% private owner-operators* – Situations in which the infrastructure asset is the property of a private company, which therefore assumes responsibility for all aspects of its provision, based on commercial principles.

Whichever combination of in-house production, outsourcing and devolution a country employs to supply infrastructure, governments create these models and remain responsible for ensuring that they are designed and implemented according to high standards of good governance.

What is distinct about the current context?

Surface transport infrastructure has always had the qualities set out above, and it has long-since been obvious that the private sector can be used to handle operational tasks. Why then is there such particular focus at the present time on developing the role of the private sector, and on searching for alternative ways to organise infrastructure provision?

Governments throughout the world are facing similar problems with regard to surface transport infrastructure provision. Key elements of their transport systems are proving insufficient to meet demand, resulting in congestion and leading to calls for significant upgrading and additions of capacity. At the same time, the vast existing infrastructure systems in most countries need constant maintenance in order to remain serviceable. While expanding capacity is not the only means of addressing congestion, large investments will certainly be required in many instances. This will inevitably involve significant outlays of capital at a time when societies' resources are stretched by the need to meet a vast array of competing priorities.

An important point to note in this context is that tax revenues from the road sector are higher in many countries than the budget resources spent on road construction and maintenance. In other words, limitations in the availability of resources for financing surface transport infrastructure may reflect shortfalls in other areas of the economy, which have been subsidised using revenues derived from transport.

With this as a background, three reasons are often put forward for employing innovative means of providing surface transport infrastructure:

1. To seek out new sources of financing.

2. To overcome constraints on the size of budget deficits and state debt, and thus facilitate additional borrowing. Non-traditional models for infrastructure provision can be designed to meet this objective by putting borrowing and debt "off budget".

3. To enhance efficiency in the infrastructure sector, *i.e.* to get more out of existing resources without jeopardising quality in service delivery.

The following sections address each of these three motives.

The link between financing and the organisation of infrastructure provision is weak

The task of financing infrastructure is sovereign to the extent that governments must decide how much public sector resources will be dedicated to transport, and in which modes and projects. But the task is also operational in the sense that responsibility for raising funds by way of tolling or borrowing can be delegated to private or otherwise independent entities.

One advantage often claimed for some outsourcing and devolution models is that they create new funds for infrastructure provision. This argument is weak, however, as most infrastructure must ultimately be paid for by taxpayers or infrastructure users, or a combination of the two. These may be today's taxpayers and users making direct contributions towards costs, or tomorrow's, paying off debt.

The means of channelling financing from these sources into infrastructure are also limited: It can come by way of allocations from the public sector budget; it can be derived from the application of user charges, such as tolls and fees; and it can come from private borrowing, repaid by future taxes or user charges.

Innovative financing mechanisms will not change these facts, although they may assist in bringing in new, private, sources of investment capital, including private borrowing and equity. This may bring projects on stream more quickly by reducing dependence on governments' budgeting cycles. However, ultimately, users and/or taxpayers will have to pay back these loans.

No model for infrastructure provision automatically assumes a given financing mechanism. PPPs, state-run enterprises, not-for-dividend companies and public agencies can all be subject to different degrees of state support. They can also receive their incomes wholly or partially via user charges. User charges may be set by governments based on specific policy objectives, or left to the infrastructure provider's discretion with a view to ensuring adequate return on investment. The choice of financing sources and mechanisms, therefore, has only a weak link to the choice of model for providing the infrastructure.

The choice of which combination of financing sources will be employed and how funds will be channelled from these sources is always a key sovereign responsibility. It is a decision that must occur during the earliest stages of the design of the overall model for providing infrastructure. The choice of model for providing infrastructure is, thus, linked to the government's decision with regard to how financing will take place. In particular, if an infrastructure provider does not have complete control over tariff levels or if user fees do not cover costs, then some provision must be included to ensure adequate compensation by government.

Putting debt off budget should not be the sole basis for choosing the model

Government can delegate the task of financing to an independent entity, for example through a PPP where the private partner or a special purpose vehicle (SPV) assumes debt. In this way, the loans taken out to pay for infrastructure are not reflected on the public accounts. This can be a politically expedient way to have new infrastructure built without an immediate visible impact on public debt.

Beyond these political considerations, there is little linkage between the budgetary treatment of debt and the benefits of a given model for infrastructure provision. But, even if debt is not visible in the public accounts, the government is committed to paying back the loan under some instalment scheme, to the extent that it is not paid back based on user charging.

Rigorous discipline is required when undertaking borrowing to finance infrastructure, especially where this is off-budget. Otherwise, governments may make commitments that prove to be unmanageable in the longer term. In other words, debt-based infrastructure financing requires long-term consideration of budget implications. This kind of assessment needs to be an explicit part of the policy and regulatory framework for infrastructure investment.

Formal limitations – such as credit ratings – on debt and deficit spending exist for a reason, namely to provide for long-term macroeconomic stability and growth. Thus, the means to provide for infrastructure should not be designed only to thwart these controls. Keeping debt off the budget is not an economic argument for preferring one model over others, although an off-budget mechanism may, in some circumstances, be the most efficient.

Efficiency should be the primary objective in the choice of model for infrastructure provision

A key point emphasized throughout this report is that the choice of model for the provision of infrastructure should be guided by the third motive stated above: Which model provides the greatest degree of socio-economic efficiency?

Efficiency itself can be seen in two dimensions. The first is allocative efficiency in the use of society's resources. There are two key aspects:

1. Resources should be allocated to infrastructure if the social benefits, calculated over the lifetime of the asset, exceed the costs – that is, if the net present value is positive, and is greater than that of other possible uses of the same resources. The acknowledged technique for carrying out this assessment is social cost-benefit analysis (CBA).

2. Available assets – *i.e.* the existing road and railway networks – should be used in the most effective way possible. Economic theory tells us that this occurs when users are charged the marginal social costs of infrastructure use, including externalities.

Productive efficiency – the second dimension – refers to minimising the use of resources in a given initiative, once the decision has been taken to carry it out. This means that infrastructure should be built at the lowest possible cost, without compromising quality.

The direct government provision of infrastructure has its benefits and disadvantages

Our benchmark for the analysis of different organisational models is a government ministry that is responsible for all activities related to infrastructure provision. This comes with some benefits and several problems.

The primary advantage is that government ministries provide for the greatest control by elected officials over key public assets and, thus, for the greatest accountability. A ministry is a hierarchical organisation that reports directly to the minister, and is subject to public sector rules regarding transparency. Oversight is typically provided by parliament and an office of national accounts, and perhaps also by the finance ministry, as well as by public scrutiny. Providing infrastructure via a ministry allows parliament, representing the voters, to hold the administration accountable for its decisions.

A further advantage is that ministries benefit from public sector borrowing rates, which typically are lower than those offered to the private sector.

However, the bureaucratic nature of decision-making in ministries may not lend itself to the operation of dynamic transport undertakings. Furthermore, it may be difficult to disentangle short-term political priorities from the day-to-day implementation of policies.

The lack of commercial orientation of a government ministry is perhaps not best suited for the pursuit of maximum efficiency. Furthermore, the typical government budget cycle, with decisions taken on an annual basis, makes it difficult to provide for long-term planning over the life cycle of infrastructure.

Ministries must also compete for funds with other public priorities. Since ministries are typically responsible for a wide range of activities, infrastructure funding may have to fight for resources in competition with other priorities within the organisation as well.

In short, by their very nature, ministries may be challenged in their ability to take decisions that maximise allocative and productive efficiency.

Outsourcing and devolution offer ways of overcoming these limitations. Indeed, the provision of all aspects of transport infrastructure by a ministry using in-house resources is rare in OECD countries.

Rather, where roads are concerned, most countries outsource the operational tasks of works and maintenance on a case-by-case basis, and most rail systems are operated by independent entities that are either state-owned or fully private. Furthermore, governments are increasingly considering a variety of other options, including PPPs.

Outsourcing by way of PPPs has the potential to enhance productive efficiency

PPPs involve transferring to the private sector an extensive package of responsibilities over a long period of time, including associated risks. The various tasks that can be included involve some combination of design (D), building (B), financing (F), operation (O), and/or maintenance (M), which are followed by the transfer (T) of responsibilities back to government after the end of the contract term. The arrangements are described by acronyms that characterise the elements involved, *e.g.* DBOT, DBFO, *etc*.

The potential benefits of PPPs derive from placing the operational tasks associated with the provision of infrastructure in the hands of the organisation best placed to carry them out successfully. This can be seen in terms of establishing an appropriate relationship between the *principal* – which establishes the required tasks – and the *agent* – which executes them. A basic assumption behind the use of PPPs is that a private-sector agent will have greater incentives to reduce overall costs – based on the pursuit of profits – than a public organisation. However, these arrangements also create a new management challenge, as the public principal and private agent will inherently have different objectives. The private agent's productivity may be very difficult to evaluate, which could induce the company to increase profits by cutting corners. Thus, the actual achievement of efficiency gains requires that the use of PPPs be very carefully structured.

In particular, the extent to which outsourcing via PPPs will enhance efficiency depends on the following factors:

i. Adequate *ex ante* cost-benefit analysis.

ii. The bundling of responsibility for construction and maintenance.

iii. The degree of competition during the tendering process.

iv. If quality is appropriately accounted for in the request for proposals.

v. If innovative behaviour is encouraged.

vi. If risk is appropriately allocated.

vii. Project realism.

viii. The method of financing.

ix. The cost of capital.

x. Institutional arrangements.

xi. Ongoing improvements to PPP models based on ex post analysis of existing projects.

These prerequisites are examined in the following sections.

i. Again, efficiency is the key

In order to maximise social welfare, PPPs should be employed when ex ante analysis demonstrates that the infrastructure resulting from a project will deliver greater benefits than it cost to build.

In a first stage of the decision-making process, rigorous ex ante cost-benefit analysis should ascertain that the initiative has a positive net present value. Costs and benefits should be considered in the widest social sense, including such questions as externalities resulting from the project. It is essential to consider the transactions costs associated with projects, as well as the cost of government oversight and regulation.

An important aspect of this analysis is the examination of alternative means of carrying out the work. A "public sector comparator" (PSC) is calculated in many countries to assess whether a PPP provides positive "value for money" in comparison with more traditional, public methods of investment. However, such analysis needs to recognise its limitations. Given the long life cycles of many projects, some basic cost elements may change due to conditions that cannot be foreseen, including changes in policies, demographics and technology. There may also be benefits associated with the involvement of public or private management – such as the level of accountability and transparency, management efficiencies, and other elements – that may not lend themselves to strictly financial comparisons.

ii. Projects should be designed to minimise life-cycle costs

A primary motive for PPP contracting is to enhance productive efficiency by minimising costs over the life cycle of the asset. A basic logic is that more spending on creating the original asset can result in lower future maintenance costs, and vice versa. A profit-seeking organisation that is responsible for construction as well as ongoing maintenance and operation will have incentives to minimise the overall costs over the longer term. Many public entities would find this a challenge because of restrictions posed by annual budgeting.

This implies that, for successful PPPs, construction and maintenance should be included in one single contract. The contract should be for a long period of time and formulated so that any consequences of the initial design standard are assumed by the party that has chosen this standard.

iii. Effective tendering is essential for cost minimisation

To identify the private partner that is willing to carry out the project for the lowest possible cost, it is essential that there be sufficient competition in the tendering process. This provides potential builders with incentives to submit bids that are as close as possible to the costs of carrying out the work. This is particularly important given that, once the contract is let, the private partner's performance may be difficult to fully monitor. Competitive bidding must, therefore, include the participation of a number of truly qualified bidders. The tendering process should allow access to international partners in order to ensure that the best available expertise has an opportunity to participate.

iv. The contracting conditions must safeguard quality

However, cost reductions could be achieved by compromising quality, resulting in higher costs to users in the form of future wear on vehicles, reduced safety, etc. To avoid this, the tendering process must include some detailed quality specifications and related performance criteria. These typically cover the following issues:

- The road or railway must be available for use as early as possible, and should not be unduly closed down for maintenance or any other reason.
- The physical quality of the asset – such as a road's smoothness – should meet a minimum acceptable technical standard.

- The asset should be safe and meet with appropriate environmental standards.
- When the contract is terminated, the asset should not be in a condition such that major rehabilitation would be required.

To make these conditions stick, payment to the contractor should be performance-based, meaning that the service provider should be paid less if the quality provided is below set standards, and, optimally, more if it is higher. The bids submitted during the tendering process should be for life-cycle costs; the bidder that is willing to take on the project for the lowest amount of money, calculated over the length of the contract, while maintaining quality standards, should be given the assignment, other things being equal.

v. Contracts should promote innovation

The combination of long contracts and performance-based specifications provides incentives for innovation. This is particularly the case if contractors are given the freedom to build the facility in the way they see as most effective, and quality criteria avoid unnecessary detail. A profit-maximising private partner can be expected to constantly seek out innovations, to the extent that they lower costs. PPP contracts should be more concerned with the outcomes of the work, as opposed to determining how the work gets done.

vi. Risk must be appropriately allocated

There are many risks associated with infrastructure provision. These include, *inter alia*, those resulting from design, construction, availability, demand, operations, financing, political circumstances, environmental questions, and *force majeure.*

Some of these risks can be mitigated by the way in which the infrastructure is designed, built and managed. Others are beyond the direct control of any partner.

The conditions for handling risk must be carefully established in the contract. A fixed-price payment, for instance, means that the private partner must take on any extra costs, if these occur, with the result that unforeseen circumstances will affect the company's profits. However, because many risks are beyond the private partner's ability to control, fully fixed-priced contracts are unlikely. A typical contract identifies certain risks to be retained by the government. For example, the indexing of payments reduces the consequences for the agent of unanticipated changes in the inflation rate. Also, payments to the private operator may be higher if the number of vehicles increases faster than expected, since this would increase maintenance costs.

In general, risks should be assigned to the partner best able to manage them. To establish whether this is the principal or the agent, the following questions should be considered:

- Who could best avoid or eliminate the source of the risk?
- Who could best reduce the likelihood of a bad outcome, should the risk materialise?
- Who could mitigate its consequences?
- Who has the lowest costs for carrying risk?
- Can insurance mechanisms be used to spread the costs of the risk?

The assignment of risk requires the careful allocation of project risks to the private partner, and of external risks to government. If a private company is responsible for construction, it makes sense that

it would also be made responsible for inappropriate performance of the asset, as well as for its overall availability. In this way, the company will be motivated to ensure that the design does not generate risks that impact on downstream performance and availability.

This does not, however, preclude that some external events, such as high inflation or *force majeure*, could affect the construction or service delivery phases of the project. Government actions can also have an impact on construction and service delivery, for instance by failing to secure required rights of way, legal approvals or public buy-in for a project. It may thus be appropriate to leave some of this risk with the public sector, but it is important to make explicit which risks, and in what circumstances, fall to each of the parties.

Demand risk is highly conditioned by GDP and fuel prices – factors that a private contractor cannot control. Provision for this risk can be made in a number of ways. For instance, traffic growth above or below what is anticipated can be made to affect the length of the contract, thereby mitigating the most serious consequences of unexpected deviations from traffic forecasts. Private partners can be compensated at different levels, or subject to different interest rates on public loans, depending on traffic.

There is no way of generalising exactly how risks should be allocated between the parties; rather, this must be carefully designed based on the nature of the project. However, it is essential to recognise that the private partner will expect to be compensated financially for any risk it takes on, and this will be reflected in the bids that are submitted. In many cases, the costs of transferring risk will outweigh the benefits of an initiative, meaning that a PPP is not an option.

PPP contracts are typically incomplete in that all eventualities are not foreseen in the formal statutes. Given the length of these contracts, events are likely to occur that cannot be anticipated when the contract is signed. Thus, renegotiation at some point of time should be foreseen for most long contracts, and should take place in an orderly fashion, emphasizing the "partnership" element of PPPs.

Because of the incompleteness of contracts, a key question is the extent to which risk can genuinely be made to stick to the private partner over time. Most transport infrastructure assets have no value other than that for which they are created, and a failed project cannot easily be taken over from one private partner and resold to another without the government assuming important additional costs. This caveat implies that the private partner can have significant leverage over government in renegotiating the contract. Thus, there is a genuine risk of strategic underbidding on tenders on the assumption that additional payments can be negotiated at a later stage.

vii. Project realism is vital

Where projects run into difficulties, the roots of these are often to be found in their design. Projects must be *realistic*. This concept comprises several dimensions.

To begin with, the project must be founded on rigorous assessments, particularly with regard to projected demand, and the extent to which users will be willing to pay tolls where these are applied. These calculations should take into consideration possible alternatives to the new infrastructure and how these might be affected and develop – for example, improvements in bus and taxi services may greatly reduce ridership on a new rail link.

Perhaps the most important principle is that PPPs should not be employed as a means of expediting politically attractive projects that otherwise do not meet the performance criteria for selection under standard public sector procedures. For both fully public and PPP projects, priority should be based on socio-economic returns.

viii. Private financing can enhance commitment and expedite projects

Many PPPs involve the outsourcing of financing. This means that the private partner(s) provide up-front investment, usually based on some mix of equity capital and commercial loans. Asking the contracting parties to invest directly in the project can be a means of increasing their commitment and reducing their leverage over government in later renegotiations, depending on the contract design.

If the private partner is reimbursed for initial construction costs over the life cycle of the project, either by user charges or government payments, this means that it risks greater losses in the event of project failure, and any renegotiations with government are more likely to occur on a more even footing. In contrast, an agent that is reimbursed for construction costs immediately and subsequently only receives annual payments for maintenance costs has less to lose. The outsourcing of financing is, in this sense, an instrument to increase the likelihood that the scheme will be a true partnership. However, a key issue is the extent to which the partners are truly exposed financially by the nature of their investment – for example, borrowing by a special purpose vehicle may shield some partners from the full consequences of failure.

The participation of commercial lenders can also prompt outside oversight, as banks will want to ascertain that the concessionaire is demonstrating due diligence in order to reduce the risk of default. The interest paid by a private partner can thus be partly seen as payment to the lenders for their monitoring of the agreement. An important question, though, is the degree of bank expertise where transport infrastructure projects are concerned.

Commercial financing can also provide incentives to open a new piece of infrastructure earlier than would otherwise have occurred using "traditional" public budgeting processes based on annual allotments. The private builder will be motivated to open the facilities as soon as possible in order to commence receiving related payments.

ix. The cost of capital is a key determinant

One down side of employing private financing is that a private consortium typically has to pay higher interest on its loans than the public sector, depending on the country and the level of risk assumed. However, from a social perspective, the difference in the costs of public and private borrowing may be less relevant, as it can reflect the fact that governments enjoy credit insurance in the form of the right to tax, without any obligation to remunerate taxpayers and users for cost overruns and time delays. The key question is the extent of the difference between the costs of public and private borrowing, and this plays an important role in calculations of the relative benefits of public versus private options for infrastructure delivery.

Governments may seek to reduce the interest differential by way of loan guarantees. However, any instrument that lessens the consequences of non-payment will also reduce the private partner's commitment to the project, as well as the government's bargaining position in the case of renegotiation.

x. Adequate institutional arrangements are essential

There must be adequate preparation of the procurement process. The public sector procurer must have a clear vision of what is to be achieved and how success will be judged. The public should be consulted in advance, and necessary approvals (*e.g.* environmental assessments) obtained before work begins. Otherwise, legal and other challenges could lead to costly work stoppages.

An appropriate regulatory environment must be in place to protect the public interest, as well as to provide private partners with the assurance that their rights and commitments will be respected. This may include enabling legislation to allow PPPs to exist, as well as legislation allowing for tolling and safeguarding property rights. These instruments must be created at an early stage of the process, as their absence can lead to costly time delays at later stages.

There must also be adequate capacity within the public sector to design the contracting process, oversee contracting and negotiations with bidders, and monitor and regulate the implementation of the project over the longer term. Governments need to gain adequate knowledge and capacity before creating PPP arrangements. Governments that have no experience with Design-Build arrangements cannot be expected to instantly attain the capacity to manage highly complex PPPs, which require negotiating with experienced international companies. There is much logic in creating a central unit, serving all of government, where employees with a range of skills in this area are concentrated. This will also assist in ensuring policy coherency, and avoid the duplication of competencies throughout the various ministries overseeing PPP arrangements.

Insufficiently prepared projects will very likely be subject to renegotiation to the detriment of the public partner, with the costs borne by future taxpayers and users long after those responsible for the arrangements are retired. Thus, clear principles should be established for the use of these instruments, including many of the points outlined in the above discussion. The primacy of efficiency as an objective should be front and foremost among these.

xi. Ongoing ex post analysis is essential

PPPs are a relatively new phenomenon. Few such projects have been brought to completion, and there is an important need for ongoing, independent ex post analysis. The results of analysis of this sort, across a range of countries, will be very valuable in designing future PPPs.

Devolution of control can also enhance efficiency

Government options are not reduced to the choice between infrastructure provision within ministries versus PPPs. The devolution of control over the provision of infrastructure to independent or quasi-independent entities – such as agencies; state-owned companies; private, not-for-profit organisations; and outright privatisation – may also result in efficiency gains.

i. Specialisation is a key factor

Ministries are typically responsible for a wide range of responsibilities and tasks. In contrast, an entity focusing strictly on a single task – such as providing roads – does not have to juggle unrelated priorities, and is thus better able to concentrate decision-making on the specific issues surrounding infrastructure provision. This includes the planning process regarding where and how projects should be built, as well as the procurement of work related to new investment, maintenance and operation. Devolution of control can, therefore, enhance the likelihood of producing the correct services, in the right amounts, at appropriate quality, and at the lowest possible costs in order to meet society's needs. An organisation that focuses specifically on a given task can, in other words, be better placed to maximise allocative efficiency in the choice of which initiatives to undertake, and productive efficiency in carrying them out.

ii. Management improvements may accompany devolution

There are various reasons to suppose that infrastructure management may be more effective under independent entities.

To begin with, greater independence is usually accompanied by increased de-politicisation of operational decision-making processes. Although elected officials should have a decisive influence over how much public money is spent in different sectors of the economy, their input into the planning process should first and foremost be in terms of high-level priority setting. Project planning should, in turn, be based on expert advice regarding the relative efficiencies of the different options to deliver the objectives established at the political level. More operational decisions – such as how works are executed, and by whom – should be taken at an entirely non-political level.

Secondly, if an independent entity does not have to rely on the government's annual budgeting process, it is in a position to take a longer-term, strategic approach to the management of assets. This independence may come in several forms and various degrees. With the exception of the government agency, all of the models of devolution can borrow from private sources, which can impose additional discipline based on the need to retain a high credit rating, at least as long as the government does not underwrite their debt. Where independent entities are financed by tolls or earmarked charges and taxes, and not totally dependent on public-sector financing, they can take a longer-term perspective on investment than would be possible under government budgeting rules.

Independent entities should also be free from some of the more bureaucratic aspects of public sector decision-making and management.

iii. Government oversight will remain a key issue

The virtues of the various models for the devolution of control are also, potentially, their failings. Models that provide a high degree of direct political accountability are also most likely to be subject to political interference in operational decision-making, and have the least incentives for efficiency. Those with the greatest independence are the hardest to hold accountable. It is always important to keep in mind that surface transport infrastructure comprises key public assets, typically created using significant public contributions, and which have enormous consequences for the rest of society. This is why the public sector typically must maintain a strong interest – the question is to what extent and how.

Government agencies allow for a high degree of public oversight and remain closely beholden to political decision-making, especially with regard to financing, and are still subject to many government rules with regard to internal processes. Fully or partially state-owned companies are also subject to oversight by way of their ownership, and this can limit their leeway in taking decisions on a strictly commercial basis, such as in decisions to cut services or staff. The agency, state-owned company and private, not-for-profit models do not involve the inherent discipline and drive for efficiency that should result from the need to report to shareholders, although they have the advantage that all revenues can be reinvested in the infrastructure.

The further the devolved entity's operational decision-making is from direct political control, the more important it is to have a solid legal and regulatory framework in place to ensure that the public interest is taken into consideration. This is particularly the case where the entity essentially operates as a monopoly. Developing and maintaining this framework requires the government to build up appropriate competencies, and supposes costs.

Private, not-for-profit companies perhaps allow for some middle ground, in that the presence of stakeholders – including government – on the board of directors may limit the need for regulation. Also, these entities are created by government, which may establish clear terms for reporting and accountability in their enabling agreements. The precise benefits and problems with not-for-profit companies will, at the end of the day, depend on how the government sets up the organisations.

Where any privatisation is concerned – be it of the operating company or the actual assets – close consideration should be given to the motives, as the consequences are long-standing. Politically, it may be expedient to facilitate an influx of capital into the public coffers, which may then be spent on other priorities; however, the financial benefits of this will be short-lived, while the impact on the transport system and its users will endure. Of course, the devolution of an inefficient public entity may cause it to introduce better management practices, while lifting a weight off the public budget.

In reality, infrastructure may go through phases depending on its level of development at any given point, as well as on society's needs and the strength of institutional structures. For example, considerable state involvement may initially be required to create new networks; however, at a later stage they may be more stable in terms of their usage and construction needs, implying that they may more easily be operated on an arm's length basis, to one degree or another.

"Who should pay for infrastructure, the user or the taxpayer?" The question has no unambiguous answer

Our description of allocative efficiency established principles regarding how much users should pay for the infrastructure they employ: The use of surface transport infrastructure should, in principle, be charged for on the basis of marginal social costs. This means that the amount paid by users should cover the additional costs imposed on the system by their use of it. These costs include wear and tear and congestion, as well as the environmental and safety costs of infrastructure use.

In reality, there are several practical problems related to the implementation of marginal cost pricing. Costs may be difficult to estimate, especially where externalities are concerned. Also, as costs vary across road and railway networks, efficient pricing requires a much higher degree of differentiation of charges than is currently practised. For example, fuel taxes are basically the same over the whole road network, although the costs of using the network in different locations and at different times are not the same. It should be more expensive to use congested road or railway capacity at peak traffic times.

Charging technology is developing rapidly and new innovations – such as satellite-based pricing – can facilitate a much higher degree of differentiation of charges. Moreover, several countries are now employing systems for urban congestion charging (*i.e.* Singapore, London and Stockholm) and for charging for the use of separate parts of the road network, particularly by heavy vehicles (*i.e.* Austria, Germany and Switzerland). The public is clearly much more receptive to new charging structures where it perceives concrete benefits, or at least a means of dealing with specific problems.

Applying marginal cost pricing principles to large infrastructure facilities often implies a relatively low price. This is because marginal wear and tear costs on a new facility are generally low and, most importantly; it is likely to be uncongested – at least at first. Charging a high price to recover investment costs quickly would induce users to seek out other, possibly more congested or less safe routes, especially if these are not tolled. This would, in turn, mean that the new facility is underutilised.

If governments limit charging on new infrastructure, they must be willing to provide subsidies. But taxation to cover the cost of the subsidy also has well established efficiency-reducing consequences. For example, income taxes will change peoples' tradeoffs between work and leisure.

This brief discussion only begins to reveal the complexity of the challenge of identifying appropriate pricing; essentially governments must strike a balance between the distorting consequences of tolls and user charges on one hand, and of taxation on the other. If high tolls on a road would lead to underutilisation, then government would be mistaken in giving a private operator

carte blanche in applying charges. However, if the private operator cannot charge as it sees fit, the government must be ready to make up any difference between costs and revenues. Thus, the reasons for seeking non-government involvement must, again, be rooted in the pursuit of efficiencies, as opposed to a desire to see someone other than the general taxpayer carry the full costs.

Governments must take a stand on pricing policy at the point when different models for infrastructure provision are being conceived, particularly given the impact of pricing on the achievement of relative allocative efficiency.

What we are seeing today

Current international experience reveals a great diversity in the use of the models discussed above.

Where roads are concerned, in terms of kilometres, the extensive systems that exist in most countries are provided, for the most part, by public entities using the structures that allow for the greatest political control – ministries and agencies. However, particularly in developed countries, they are also subject to much basic contracting out of discrete tasks.

At the same time, there is also considerable use of alternative models. According to one source (Public Works Financing, 2005), internationally, in the period 1985-2005, 389 PPP road projects were funded, and an additional 375 were planned, representing a total of over USD 380 billion. In some countries, much or all of the national motorway networks has been placed under private operation. In other instances, networks are operated by fully or partially state-owned companies. Full privatisation of major roads has not been attempted.

The infrastructure subject to PPPs and concessions tends to be high quality routes, which offer special services, such as greater convenience, higher speeds, less congestion and more safety. Many PPPs focus on particular, high-profile links, while many network concessions involve the transfer of mature motorway assets created with considerable public support.

The fact that these alternative models do not account for most kilometres of road should not downplay their importance – in many cases they provide for key infrastructure in important, strategic areas, and move a high proportion of total traffic. There are countries where more road investment now comes through private companies than public entities.

Most roads are not subject to direct charging, and most OECD countries extract more revenues from the roads sector – especially fuel taxes – than they spend there. There are few exceptions where all road revenues are specifically earmarked.

A wide range of means is employed for remunerating infrastructure providers, including shadow tolls, availability payments and direct tolling. Often, different means are employed in the same project. Direct tolling generally involves routes providing special levels of service, which are often accompanied by alternative, untolled roads. Some PPP and devolution arrangements transfer responsibility for tolling, although charging levels are usually regulated; in other instances, governments collect tolls and transfer these to the infrastructure provider. Efforts to link user charging with the specific impacts of road use are sporadic, although there is growing interest in the area, and technological advances are creating new opportunities.

Private borrowing is common, by concessionaires as well as by state-owned companies. Governments are also seeking innovative means of accessing private borrowing and investment without this necessarily being linked to devolution or outsourcing. For example, special financing

instruments, such as bonds, may be created to leverage private funds for a specific project that is managed by government, thus allowing for a steady stream of financing over the longer term. Also, some governments are considering ways of taxing the increase in land values associated with new infrastructure. Additional revenues can also come from renting land for ancillary services, such as gas stations on motorways or parking at train stations.

Rail infrastructure provision also presents a varied picture around the world. Current experience shows essentially three options for network service management: (1) Large organisations that integrate both carrier service and infrastructure; (2) fully separate infrastructure and service providers; and (3) service providers that pay to access the infrastructure owned by those in the first category. There are instances of infrastructure provision falling under the responsibility of government ministries, but most OECD and International Transport Forum countries employ some degree of devolution.

One key factor in determining how the rail sector is organised is the extent to which it is oriented towards self-financed commercial operation, or towards the subsidised provision of rail service based on perceived social or environmental benefits. Various combinations exist in different countries – in North America, for example, freight rail is commercially provided by vertically integrated private companies, while passenger rail is subsidised and provided mainly by state-owned companies. In most countries where vertical separation is the norm, state-owned companies provide the infrastructure. One country, the United Kingdom, is experimenting with a private, not-for-profit provider, following the collapse of its privatised national rail infrastructure company.

PPPs are also increasingly common where rail is concerned. As with roads, they are often employed to provide special, high-profile services, such as high-speed lines or city-airport links. Data from 1985 to 2005 revealed 133 rail PPPs funded internationally, and an additional 142 planned, for a total of over USD 270 billion.

Where rail financing is concerned, it is usually assumed that some degree of user charging will be employed. However, there is a great range of experience across countries with regard to the extent to which the costs of infrastructure use by carriers are covered by charging. In a few cases in Europe, user charges do not cover the marginal costs of infrastructure use, which suggests that assets are not being sufficiently maintained.

It is clear that the use of devolution and outsourcing, and of innovative financing, varies enormously around the world. Where PPPs are concerned, while these have become a standard part of the infrastructure provision lexicon, their role in different countries is far from homogenous. While great differences exist among OECD countries, the greatest are perhaps with regard to transition, middle and low-income countries. In the 1985-2005 period, Africa and the Middle East accounted for just over 1% of funded road and rail projects, by value, while Latin America and the Caribbean accounted for just over 8%. This compares with 54% in Europe, 37% in Asia and the Far East, and 19% in North America.

Concluding remarks

It is not possible to provide a universal blueprint for the models that should be used for the provision of surface transport infrastructure; a wide range of options is available, combining different institutional and financing models, and solutions must be adapted to each set of circumstances.

However, this report identifies a number of basic principles and issues that should be considered by governments in deciding how to meet infrastructure needs. At the core of these is the conclusion that the pursuit of long-term efficiency gains – considering costs and benefits in the widest socio-economic sense – should be at the heart of the decision-making process.

PART I. THE PROVISION OF SURFACE TRANSPORT INFRASTRUCTURE

This section provides an overview of the task faced by governments in providing for societies' surface transport infrastructure needs. It begins in Chapter 1 with a discussion of the overall elements of that task, the organisational models available for carrying it out, and the financing mechanisms available. Chapter 2 provides an overview of observations regarding how many governments are currently going about applying these models and mechanisms.

1. FRAMEWORKS FOR THE PROVISION AND FINANCING OF SURFACE TRANSPORT INFRASTRUCTURE

1.1. Introduction

The provision of infrastructure refers to all of the tasks required to ensure an adequate supply of infrastructure services in order to meet the needs of society. As surface transport infrastructure provides a fundamental underpinning to much – if not all – other social and economic activity, this responsibility ultimately falls to governments.

This does not mean that governments must conduct all elements of infrastructure provision directly. Indeed, the various elements may be carried out by public, quasi-public or private entities, resulting in a myriad of different models.

This chapter outlines the component parts of the infrastructure provision challenge. It begins in Section 1.2 with a discussion of what makes the question of surface transport infrastructure distinct from other areas of the economy; in other words, why it cannot be subject to full market forces. It then continues with a discussion of the goals of infrastructure provision in Section 1.3. Section 1.4 addresses the organisation and management of infrastructure provision. Section 1.5 discusses means by which key responsibilities may be delegated by government to independent organisations, while Section 1.6 outlines the various specific models. Section 1.7 discusses financing, and its relation to the models. Section 1.8 looks at how responsibilities are typically divided up in the various models.

1.2. What makes surface transport infrastructure different?

There are some features of surface transport infrastructure that make its provision distinct from many other areas of the economy and which will likely have to be accounted for when different models are being considered.

One such aspect is that transport is a “derived demand”, meaning that transport systems do not exist for their own sake, but rather to serve other economic and social activity. The availability (or lack thereof) of transport systems has an important impact on every aspect of society and the economy. This means that the possible wider implications of capacity shortages in, and the overall standard of, the transport system, must be taken into consideration in the design of any model for providing transport infrastructure.

An additional feature of transport is the difficulty of measuring the true costs of its use. There are substantial negative externalities associated with transport, including air and noise pollution, and the use of land for its construction. However, exact measurement of the costs of these, and comparisons across modes, is complex, and very advanced charging systems would be required to internalise them.

Transport-related taxes and charges, particularly fuel taxes, can be seen to cover these externalities to some extent. However, the relationship between costs and revenues is almost never exact. The use of taxes for the internalisation of external costs, in combination with their significance for revenue generation, is an ongoing problem within the sector. This is further dealt with in Chapter 7, on pricing.

Where financing is concerned, surface transport assets involve enormous investment costs, particularly in the initial stages, but also for later maintenance. Furthermore, the development of transport assets – including project conception, preparation and construction – is lengthy, and can easily take 10 or more years. Once the project is underway, the resulting assets will be employed for decades, or even centuries. This means that there is a long time during which the fundamental assumptions behind a project and the circumstances on which it is based can change.

The division of transport into modes provides additional challenges. Each mode employs a distinct logic with regard to its organisation, financing and how services are delivered, while the modes are typically in competition with one another both for traffic and for government funds.

For roads, a common view in many countries seems to be that most, if not all, of the road system should be provided without direct charge. One justification for this is that road use is indirectly charged for by collecting fuel taxes. Even where roads are subject to direct charging, this is usually for limited networks or links that provide a special service, such as higher speeds, less congestion and greater safety.

Where rail is concerned, there is usually an implicit assumption that the user should contribute to the cost of infrastructure provision, although in many countries this covers only a fraction of the full costs (ECMT, 2005). The scale and costs of network rail operations often lead to the conclusion that passenger rail cannot function without subsidies, which are usually justified in terms of the social and environmental benefits seen as inherent to this mode. In many countries this is also the case with freight rail.

Furthermore, once built, transport infrastructure does not lend itself to extensive competition in the market. Particularly for rail and inland waterways, it is unlikely that users will be offered extensive choice in the infrastructure they use, even if there are different operators on the infrastructure. This means that, where infrastructure providers function on the basis of commercial principles, a careful balance must be struck between allowing for reasonable returns and protecting the user from monopolistic pricing behaviour.

Much road infrastructure is, moreover, a public good in the economic sense of the concept, meaning that additional users can be allowed into the network without affecting the possibilities for existing traffic to use the facilities.

Taken together, the overall implication of these factors is that government has a key role to play in infrastructure provision, whatever the model chosen, in particular with regard to correcting market failures and ensuring that key services are provided for the benefit of other areas of society and the economy.

1.3. The goals of infrastructure provision

Governments' ability to provide infrastructure is inherently limited by the availability of resources. The resource restriction must, in particular, be seen in the light of infrastructure being just one of the needs that governments must satisfy using public money; other essential public policy objectives include health care, education, safety, national security, etc. The provision of infrastructure is, therefore, always restricted by the scarcity of resources, meaning that all needs are not likely to be satisfied.

Precisely because of these resource limitations, the pursuit of efficiency – *i.e.* the best possible use of available resources – is at the core of the decision regarding which model to employ for the

provision of infrastructure. If infrastructure services are efficiently provided, society's resources are employed in the best possible way, satisfying, to the greatest extent, society's wants and needs.

Apart from facilitating mobility, other policy objectives are linked to the provision of infrastructure. These include economic development, regional equality, social cohesion, safety, security, and environmental sustainability, among others.

Moreover, a key government responsibility is to promote overall efficiency by encouraging the existence of a competitive market for transport services, involving competition and interconnections between the modes. Therefore, no particular mode of transport should be seen in isolation.

These various objectives form the context in which decisions regarding models for the provision of surface transport infrastructure are taken. However, the choice of one model over others ultimately must reflect its greater efficiency in reaching these stated goals at the lowest possible costs.

1.4. Organisation and management of infrastructure provision

A great array of tasks is involved in the provision of any surface transport infrastructure. Some of these correspond directly to specific points in the life cycle of the infrastructure, while others are ongoing. The tasks associated with providing infrastructure include, *inter alia*:

Administrative tasks, including:

- Tasks related to the transport sector and each specific mode:
  - Financing of the mode.
  - Establishing high-level policy directions.
  - Definition and organisation of the political and administrative framework for decision making.
  - Allotment of responsibilities.
  - Needs assessment.
  - Selection and definition of projects.
  - Regulation of the sector and modes, as required.

- Tasks related to specific initiatives:
  - Financing of specific initiatives.
  - Preparation, definition and approval of projects.
  - Selection of procurement and delivery methods.
  - Supervision of works and assurance of performance.

Works:

- New construction.
- Extension and widening of existing infrastructure.
- Major repairs/rehabilitations.
- Maintenance.

Operation:

- Traffic management.
- Toll collection.
- Ensuring availability and quality.

These duties can be divided between *sovereign* and *operationa*l tasks. Sovereign tasks are fundamentally the role of government, and cannot be carried out by external parties.

As noted above, the overall provision of infrastructure is a government responsibility. Thus, those tasks that are inalienable from government typically involve high-level decision-making regarding the use of public funds and the model to be employed, as well as the overall monitoring and regulation of outcomes.

This contrasts with operational tasks, which need not be directly executed by government. Many of the models for the provision of infrastructure discussed in this report involve private or quasi-public entities with varying degrees of independence in their decision-making, which assume significant responsibility for various operational tasks. What differentiates between different models, as we will see, are the operational tasks they take responsibility for.

The objectives pursued in the provision of infrastructure also play a role in the extent to which responsibilities can be delegated. Where the objectives are entirely private – a railway serving only a mine, for example – most or all responsibility can be placed in private hands. But this is seldom the case. Where objectives are public, this invokes a role for government. A middle ground can be reached to the extent that public benefits can be clearly defined and priced, meaning that private providers can be paid on the basis of the benefits they provide, either by government or by the users directly. However, this still requires that a key role be played by government in identifying, measuring and negotiating a price for public benefits.

1.5. Options for the delegation of responsibility: Outsourcing and devolution

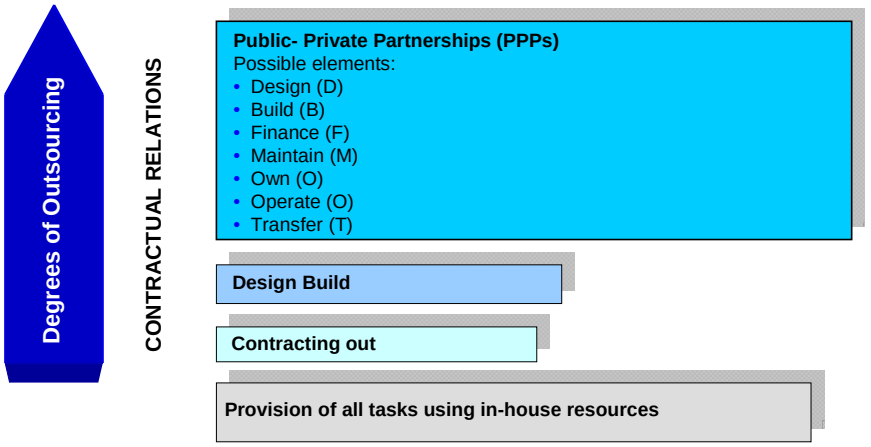
This report focuses on the alternatives for delegating operational tasks related to the provision of surface transport infrastructure. Two specific streams for delegation are identified – *outsourcing* and *devolution*.

Outsourcing refers to a situation in which a government organisation retains overall responsibility for the provision of infrastructure, but selectively contracts out aspects of that task to private companies. An important distinguishing feature of outsourcing is that it is based on contractual arrangements between the public and private actors, which are by definition of a limited time period.

There are various degrees of outsourcing where infrastructure provision is concerned. At the most basic level, the organisation responsible for providing infrastructure may contract out individual tasks – such as design, paving, maintenance, etc. – on a piecemeal basis. Beyond this, it is also possible to tender out design and building of infrastructure as a single package, which is referred to as the *Design-Build* model. Finally, the most complex form of outsourcing arrangements is the *public-private partnership* (PPP), in which an extensive package of responsibilities is transferred to a private partner over a long period of time, along with corresponding risks. PPPs are described in more detail in Section 1.5.2.

Figure 1.1 shows governments' options for outsourcing, including PPPs.

Figure 1.1. **Outsourcing in the provision of surface transport infrastructure**



Devolution refers to a situation in which the various operational responsibilities related to surface transport infrastructure provision are placed under the aegis of an organisation specifically created for this task, which is, to one degree or another, independent in its decision-making from political leaders.

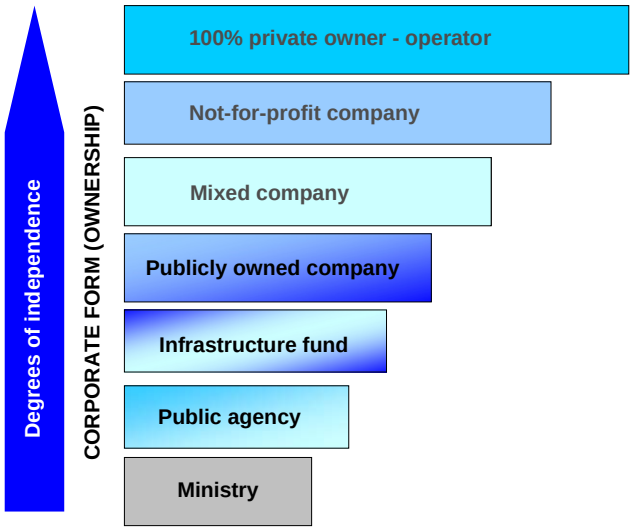
Devolution typically takes place under different, well-documented corporate forms. These are described in Figure 1.2, where each higher level involves a greater degree of independence.

Full public control under a government ministry is taken as a reference point. The farther away from the ministry the model is, the more difficult it becomes for the political level to maintain direct control over the ways in which activities are implemented. Each new corporate form therefore increases the degree of independent control over managerial and organisational responsibilities. Where mixed companies; private, not-for-profit entities; and private companies are concerned, this independence is further reinforced by the fact that government ownership of the infrastructure provider, and sometimes the assets, is reduced, in some cases completely.

An important distinguishing feature between outsourcing and devolution is that the latter does not involve establishing a contract with an external service provider. This means that there is no tendering process in awarding control over a devolved organisation.

There is some room for overlap between these concepts. In particular, there are many cases where the operation and maintenance of existing infrastructure – particularly motorways – are contracted out to private companies, although governments retain ownership of overall assets. But this often involves the privatisation of existing state companies, and thus there is no tendering involved. Examples from France, Italy and Portugal are seen in the Annex, and a further example from Japan is discussed in Chapter 2.

Figure 1.2. **Devolution in the provision of surface transport infrastructure**



Both outsourcing and devolution transform the public sector's role. For example, the government, in the form of a ministry or agency, may retain most responsibilities, but selectively outsource these on a job-lot basis to external service providers. It may also play the role of partner in a special purpose vehicle (SPV) – a commercial entity created specifically for the purpose of executing a PPP. In public companies and some SPVs, the government is a shareholder representing the public. In the case of full privatisation, government's role is one of regulator and monitor. Each instance requires a different set of competencies within the public sector.

A final point worth noting is that, whatever the model employed, it is the government that initially creates it, again implying certain responsibility for its outcomes.

1.6. The models for organising infrastructure provision

This section provides an overview of the primary models employed for the provision of surface transport infrastructure, including PPPs and the various forms of devolution. This text is primarily descriptive, whereas Chapter 5 provides an assessment of the various models in terms of their ability to enhance efficiency.

1.6.1. Government ministries

As a benchmark, it is important to underline that the task of providing infrastructure may be retained by a government ministry, such as a transport, rail or highways ministry. This provides the greatest level of public sector control over the entire range of issues associated with the provision of infrastructure, as well as the greatest level of direct accountability. Ministries are hierarchical in nature, and report directly to the minister, who is responsible before the head of government and, ultimately, the electorate.

Ministries are typically responsible for a multitude of tasks and policy objectives. For example, a transport ministry may be responsible for policy setting, infrastructure development and safety issues

in several different modes of transport. This may be one of its greatest weaknesses, in the sense that a wide range of priorities must be balanced within these organisations.

Where a ministry is responsible for infrastructure provision, oversight of its actions is provided by interactions with other ministries, as well as by public scrutiny via the press and the political process. For example, while a transport ministry might be responsible for providing infrastructure, the finance ministry may be responsible for disbursing financing from taxes and charges.

Ministries are inherently dependent on public sector budgeting processes for their financing, and are not typically able to raise money from private borrowing. They may, however, be assigned the receipts from the pricing of given infrastructure, or from related user charges, such as fuel taxes.

1.6.2. Outsourcing

Outsourcing is not only a government phenomenon. On the contrary, many private corporations partially or completely outsource their production of goods and services. Some key aspects of the production chain may be retained, while external companies are contracted to provide other elements, where they are able to do this for less cost. However, ultimately, the contracting party retains responsibility for the final quality of what is produced.

Simple contracting out has become pervasive where surface transport infrastructure remains under the control of government ministries and agencies, especially in industrialised countries. Mackie and Smith (2007) argue that, where road infrastructure is concerned, the greatest organisational change in recent times has been with regard to the practical role played by government authorities, converting them from executing agents to purchasers of externally provided services. Design-Build arrangements – in which the designing and construction of infrastructure are contracted out as a single package – are also common.

PPPs involve a much greater degree of transfer of responsibility to the private partner. In its 2004 Green Paper, the European Commission (EC) noted the following elements of PPPs, which distinguish them from more basic contracting out:

- The relatively long duration of the relationship, involving co-operation between the public and private partners.
- The method of funding the project, in part from the private sector, sometimes by means of complex arrangements between the various partners.
- The important role of the private economic operator in such aspects as design, completion, implementation, funding, etc. The public partner's responsibility lies in defining objectives in terms of public interest, quality of services provided and pricing policy, and in oversight.
- The distribution of risks between the public and the private partners, including the transfer to the latter of risks generally borne by the public sector (EC, 2004a).

PPPs can take on many forms, and are typically known by way of acronyms describing the tasks that are transferred to the private partner, such as:

(D)(B)MO (Design) (Build) Maintain Operate

(D)(B)OT (Design) (Build) Operate Transfer

(D)(B)(F)OT (Design) (Build) (Finance) Operate Transfer

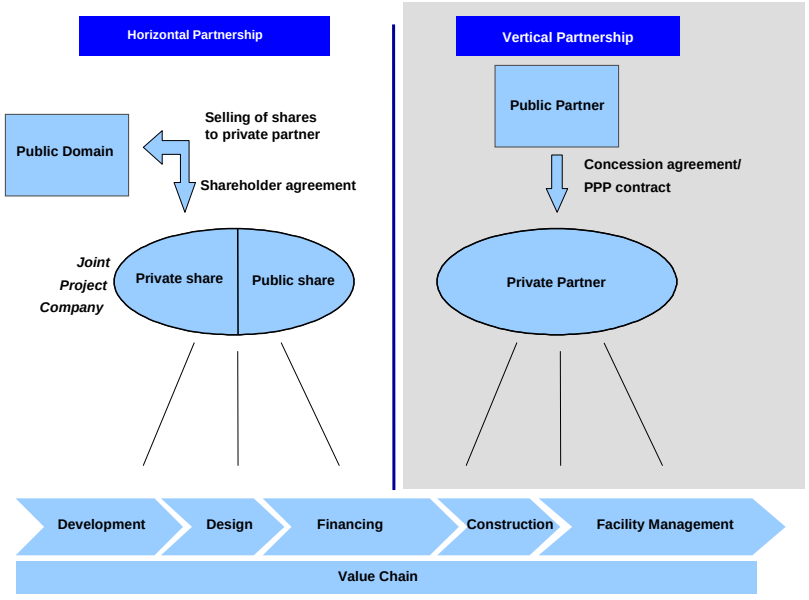
(D)(B)(F)OOT (Design) (Build) (Finance) Operate Own Transfer

The brackets around certain tasks mean that they are present in some arrangements and not in others. For example, a "greenfield" PPP project could involve transferring responsibility for designing and building new infrastructure. However, it may also be possible to only transfer responsibility for maintaining (M) and/or operating (O) existing assets. The Annex provides examples of several of these models, including in Argentina, France, Germany, Italy, Mexico, Portugal, Spain and the UK.

PPPs often, but not always, involve some degree of private capital. The "financing" component of a PPP means that a private company is asked to assume debt to finance a project, for which it is then remunerated over the life cycle of the asset. Private financing is typically provided by way of a combination of debt and equity.

PPPs can either be "horizontal" or "vertical" in nature. In a vertical partnership the public partner contracts with the private partner by way of a concession agreement or PPP contract, and the latter becomes responsible for providing infrastructure services. In a horizontal partnership both partners become directly engaged as shareholders in an SPV, which is responsible for providing infrastructure services. Figure 1.3 shows these structures.

Figure 1.3. **Different structures employed in PPPs**



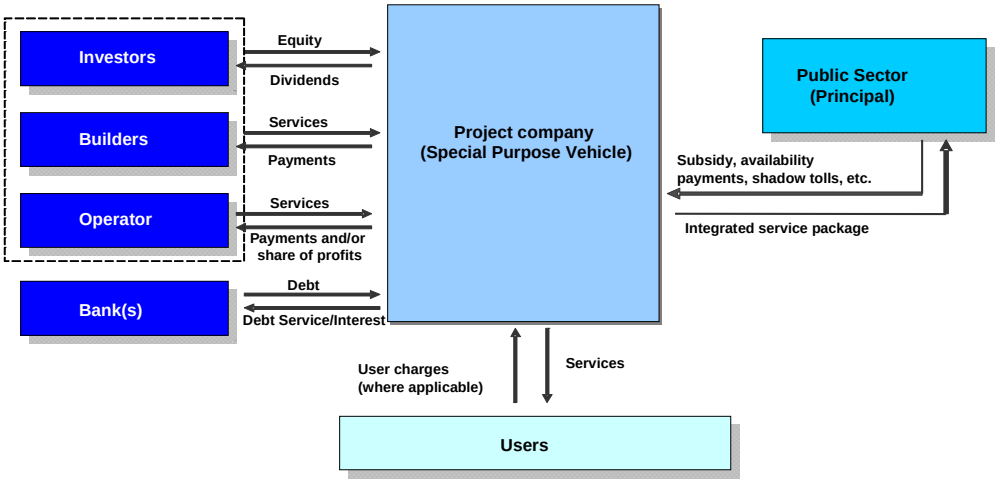
Source: Alfen, 2007.

Figure 1.4 reveals the full potential complexity of a PPP, in terms of the number of partners involved. In this hypothetical example – which is not atypical – an SPV is established. Its private partners could be many and diverse. To begin with, private investors are required to establish the arrangements, and this could involve many firms, including banks, insurance companies, pension funds, etc. Afterwards, construction firms will be needed to carry out the works, followed by an operator. However, it is also possible that these roles – or some combination of them – could be concentrated in a single company. For example, the builder and operator could be one and the same.

The builder and/or operator could also be a principal investor. Finally, private financial institutions are also typically required as a source of lending.

Furthermore, the SPV and the builders and operators may also engage other companies to conduct many of the sub-tasks associated with the provision of infrastructure. PPPs therefore involve the creation of complex networks of relationships with contractors and subcontractors.

Figure 1.4. **Hypothetical example of the flow of payments and services in a PPP**



The PPP concept is not limited to relationships between public ministries or agencies and private partners. State-controlled companies have also been seen to represent the public in PPP arrangements. The Annex discusses one example, in Austria.

1.6.3. Devolution

The following are the various corporate forms of organisations to which the operational tasks of surface transport infrastructure investment can be devolved.

Public agencies

The creation of a government agency represents an step towards greater autonomy, while still retaining a relatively high degree of public control.

While an agency might have its own management board and have separate accounts from the ministry, it generally remains directly accountable to elected officials and institutions of the government. However, as opposed to ministries, agencies are typically dedicated to a single task, such as the supply of road infrastructure.

Where infrastructure development is concerned, an agency may be delegated control over how, more precisely, resources allocated for investment and maintenance purposes are employed. A greater autonomy in determining the design of investments does not typically mean that agencies can borrow funds, unless specific approval is given. Indeed, control over the global level of resources allocated for investments – and also often the prioritisation of investment projects – is retained by the parent

ministry, which could be the finance or transport ministry. However, in some countries, agencies have some authority to collect user charges and apply them directly to the infrastructure they are responsible for.

By way of example, the United Kingdom Highways Agency is an executive agency with some management independence. Financially, it is operated as a component of the Department for Transport and is thus dependent on annual government appropriations (Virtuosity Consulting, 2005). It is also subject to the directives, guidelines and codes of the civil service. The Finnish Road Administration (Finnra) is a governmental agency operating under the jurisdiction of the Finnish Ministry of Transport and Communications.

Infrastructure funds

Agencies can also be established specifically to manage and allocate funds associated with transport infrastructure, or a given sub-sector, like roads. For example, the revenue from certain taxes or licensing fees can be dedicated for use in the sector and applied via the infrastructure fund. This is discussed more in Section 6.5, and an example from New Zealand is provided in the Annex. Depending on the structures of their boards of directors, infrastructure funds can also come to resemble the private, not-for-profit model described below.

State-owned corporations and mixed companies

Internationally, many motorways, railways, ports, canals and airports are operated by state-owned corporations. The government's role is to establish their legal basis, set their annual budgets, and define borrowing powers and limits. Thus, government is typically an enabler, customer, subsidy provider and, in some cases, regulator and arbiter (KPMG, 2005).

These bodies are usually operated on a commercial basis – meaning that they are largely dependent on the revenues they generate and must ultimately balance their budgets – and are incorporated as private companies. This provides them with some degree of autonomy with regard to raising financing from external sources, and revenues raised – such as user charges, tolls, fares, etc. – are often retained within the corporation. It also allows for a higher degree of independence in decision-making. State-owned corporations are not necessarily subject to some of the inflexibility in management processes and labour relations that can characterise the public service.

This relative independence does not necessarily imply complete financing autonomy. Indeed, state-owned companies often receive government subsidies in combination with revenues from user fees (KPMG, 2005). As discussed in Chapter 3, the European Union distinguishes between state-owned corporations that can and cannot be considered commercial entities, based on the extent to which their costs are covered by direct charging. This also has implications for autonomy in decision-making.

Such enterprises are not necessarily 100% state-owned. Indeed, in many circumstances, the state may retain a partial interest in a company that it considers to be of strategic interest, although there is also private capital participation. This corresponds to the mixed company shown on Figure 1.2.

The private, not-for-profit organisation

Private, not-for-profit organisations are free from the political control that would result from government ownership. Rather, they report to stakeholders – such as users and communities – that are represented on their management boards. The government may be represented on the board, and,

furthermore, sets the stage for the organisation's activities by way of the enabling legislation. Such organisations have borrowing powers and can accumulate surpluses from their operations, but do not distribute the revenues to shareholders; rather, all surplus funds must be reinvested.

The UK's Network Rail, for example, is a "not-for-dividend" company operating the rail infrastructure network. Various examples exist in Canada for other forms of transport, including the Canadian elements of the St.-Lawrence Seaway/Great Lakes waterway system, airports, ports, and the air navigation system. In the Canadian examples, the government retains ownership of the assets, and the not-for-profit entities are accorded long-term leases for the infrastructure, in some cases paying rent to the government. Government also retains influence over the functioning of the infrastructure by way of a place on the boards of directors.

The fully private owner-operator

The most extreme version of devolution is the fully private owner-operator. This means that infrastructure is owned, developed and maintained by private, profit-maximising companies. All direct influence over the infrastructure is removed from the hands of elected officials, meaning that the public sector must resort to regulation to influence outcomes regarding the management and use of this infrastructure.

This is relatively rare in surface transport infrastructure. A key exception is with regard to freight rail in North America, and passenger rail in Japan, where the infrastructure has been privatised along with the service providers (see example of Canada in the Annex). The model is virtually unknown in road transport, with the exception of roads developed for private purposes, such as the case described in Box 1.1.

Box 1.1. **Private roads in Sweden**

Sweden's road network comprises 98 000 kilometres of state roads, 37 000 kilometres of local community roads and 280 000 kilometres of private roads (67% of the total length of roads).

The private roads are of two categories. A major percentage is first and foremost used for transporting timber from where it is logged. They are normally also open for use by the general public. In addition, roads that are used by a few households only are administered by *road associations*, made up of property owners along the road, who use it for access to the overall road network. The associations are supposed to provide for at least parts of the costs for keeping the roads in a decent condition, directly or in kind.

Seventy-five thousand kilometres of the private roads are eligible for state support. One prerequisite for this support is that the road be kept open for public use. Many of these roads are found on the outskirts of cities.

The lesson from these examples is that, under given circumstances, a road can also become an almost private commodity.

1.7. Financing the Provision of Infrastructure

Financing, in this context, means the provision of money at the time and in the quantity that is needed to meet society's surface transport infrastructure needs. Thus, financing is a basic underpinning of the entire process of providing infrastructure.

At the highest level, financing the transport sector is fundamentally a sovereign task, which involves determining how much of the government's resources will be channelled into transport, as opposed to other policy priorities. All tasks outlined in Section 1.3 above must, of course, be financed, including the necessary administrative structures within the public sector required to oversee infrastructure provision, no matter what model is employed. Governments must also decide how resources will be distributed among the different elements of the transport system, including the different modes, and between service provision and infrastructure.

The financing of specific initiatives can be made an operational task, in that responsibility for raising funds can be shared with different parties. For example, independent entities may be tasked with raising capital for specific projects, or with collecting and employing user charges.

At the most basic level, there are two primary sources of revenue: taxpayers and users. Additional resources may come from ancillary services (e.g. renting space to service stations) or third party contributions (e.g. land owners' contributions to having new infrastructure built), although these will likely play a secondary role, and very often also come from taxpayers and users. A third source could be from the sale of public land adjacent to the new infrastructure development.

The taxpayer and the user may be the same individual, although this is not necessarily the case. A taxpayer may never use a given piece of infrastructure, especially if she or he lives in a different region of the country from where it is located. In other instances, taxpayers may not use given infrastructure, but may indirectly benefit from it by purchasing goods that are moved over it. Users may be from other countries, and thus not taxpayers in the country where the infrastructure is located. The term "taxpayers" can refer to those paying taxes today, and thus contributing to general revenues, and to those who will pay in future, and thus pay off today's borrowings.

The instruments by which financing from these sources may be channelled into infrastructure are also fundamentally limited, and are largely reduced to the following, which are described in greater detail below:

- General taxation.
- User charges.
- Borrowing.
- Revenues generated from ancillary services and third part contributions.

This discussion is primarily descriptive, while Chapter 7 considers the efficiency implications of different financing models.

A key point underlying our considerations in the following chapters is that the choice of financing source and of means of channelling funds into infrastructure is not intrinsically linked to the model employed for the provision of infrastructure. However, the means of financing will have a profound impact on how each model functions. Thus, choosing which mix of taxes and user charges to employ is a fundamental sovereign task, and must be undertaken by government in advance of designing the model by which the infrastructure will be provided.

1.7.1. Taxation and traditional budget financing

The most common financing instrument for surface transport infrastructure is the government budget, sourced from tax revenues and public borrowing.

Policy decisions establish the extent of public funding to transport as opposed to other priorities. This is based on consideration of taxpayers' priorities, often formulated in platforms established by politicians during the electoral process and finalised during discussions at the cabinet level.

Direct public financing may also be subject to negotiation between different levels of government. For example, in a federal system, taxes may be collected by the central government, although responsibility for infrastructure development and maintenance may be at the state level. In these instances, central governments distribute tax revenues to the states. In some cases, allocations are earmarked for specific purposes, and the states may lobby and negotiate for more funds. A similar dynamic may exist between municipal governments and state or central governments, or even between national governments and the European Commission.

Resources from the public sector's pool of general revenue are today, and are likely to continue being, a primary means of financing much of most countries' transport systems. This means that, as governments contemplate the use of alternative financing mechanisms, they must also determine the role of public subsidies in these. Many models commit governments to using general revenues to pay for infrastructure over long time periods, and – as will be further discussed in Chapter 3 – this must be accounted for when the original choice of model is made.

A primary complaint regarding traditional budget funding is that it does not meet infrastructure needs. However, where this is so it may be a manifestation of other priorities being put before transport in the budgeting process, which in turn is the prerogative of political decision-making. For example, as seen in Chapter 2, many countries collect more in road-related charges than they spend on roads.

Direct public financing is often seen as being inflexible and subject to political considerations. It may, therefore, be difficult to address the life-cycle costs of infrastructure and to prioritise accordingly. Budget processes can, however, be made more flexible. For example, infrastructure funding may be considered in the context of project programmes, instead of individual projects. Governments can also make long-term commitments to programmes and projects, and subject them to indexed adjustments. However, due to the logic of annual budget processes, it is difficult for governments to fully apply life-cycle cost management.

1.7.2. User charges

A user charge is levied for the purchase of a specific service. Where transport is concerned, the term usually refers to tolls and tariffs paid by travellers or shippers. Similarly, some countries use "vignettes", a permit that is purchased to allow the right to use some part of an overall road system, such as its motorways.

There is sometimes a debate about what constitutes a charge versus a tax. Technically, taxes are not seen to be directly related to consumption of a specific good or service, while a charge is. Thus, in reality, taxes on fuel could well be seen as user charges, as the revenues result from the use of roads. Indeed, a significant portion of most governments' revenue comes from taxes and charges levied on transport, vehicles and fuel. Transport-related charges and taxes can be fed into general government revenues – as is usually the case – or earmarked for use in the sector. Chapter 7 discusses the potential benefits of earmarking, while the Annex discusses the example of the earmarking of tax revenues in the US.

On roads, tolls are often collected by the entity responsible for the provision of the infrastructure. In other instances, different state entities may collect tolls, which may be specifically earmarked for

transfer to the road provider. Where charges are not earmarked, they are applied to general government accounts and thus to non-specific public policy priorities.

Technology – particularly satellite-based – is increasingly allowing for road tolling systems that are network or system-wide, aimed at charging users for their exact use of the system. For example, satellite-based tolling is employed for heavy-vehicle user charges on motorways in Europe, most notably in Germany, Austria (see the Annex) and Switzerland, which is supported as a matter of policy by the European Union. Other models exist in New Zealand and Australia (Tervonen, 2005). London, Singapore and Stockholm apply charges to drivers in the urban area with a view to managing demand, and the British government has considered pursuing network user charges across the entire road network. However, for the moment, there is still no proven technology to effectively price the use of entire road networks for all users at the point of use, although there is much potential in the deployment of satellite-based systems and advances in on-board vehicle equipment.

Where rail is concerned, the means of charging depends on the organisation of the system. Where the provision of service and infrastructure is integrated within the same entity, the service provider funds infrastructure directly through revenues from shippers or travellers. At the same time, that company may also charge other service providers to use its track, at rates that are negotiated or regulated to prevent the abuse of monopoly power. This is the case in North American railways, where large freight rail companies own much of the system (see example of Canada in the Annex).

Where there is vertical separation, carriers compensate the infrastructure provider. Furthermore, there is often an additional subsidy from the state. For example, the European Commission recently announced a EUR 200 billion plan for upgrading passenger and freight lines (Thompson, 2007). The Australian Rail Track Corporation, which is owned by the central government, recently received an AUD 1 billion subsidy from the Commonwealth Government. In the UK, the private, not-for-profit rail infrastructure provider, Network Rail, receives revenues from service providers, as well as subsidies.

Both across and within the modes, user charges may be employed with different, and potentially conflicting, objectives in mind. One purpose may be to compensate the infrastructure provider for up-front financing of a project and generate profits, which will inevitably provide the operator with incentives to increase traffic. Alternatively, user charges may be set for demand management purposes, implying a desire to limit the use of infrastructure.

1.7.3. Borrowing

Borrowing means that payment is deferred, and thus that future rather than present taxpayers or users will pay.

Transport assets typically have huge construction costs and very long life spans. This may, per se, provide a rationale for borrowing in order to even out payments among beneficiaries over time. In most countries, public borrowing is, however, not specifically linked to spending on transport.

Borrowing can also be undertaken by independent infrastructure providers. Other than ministries and agencies, the various alternative corporate structures described in Figure 1.2 are likely entitled to undertake independent borrowing in order to finance their development, maintenance and operational needs. In addition, PPP arrangements where financing is the responsibility of the contractor typically involve raising resources by way of a combination of equity and loans. Private borrowing is often not registered on public balance sheets, although it may still create obligations for governments (see Chapter 3).

Borrowing may affect the costs of infrastructure provision in so far as private entities are typically subject to higher interest rates than sovereign states or sub-national governments. Furthermore, in some instances, such as not-for-profit enterprises, the need to maintain a good credit rating for private borrowing may impose discipline on the infrastructure provider.

Apart from general public borrowing, the public sector also has the option of creating special financial instruments – such as bonds – dedicated to the development of given infrastructure. This has been particularly employed in the US, where special instruments have been created to leverage public sector grants in order to access financing from capital markets (see the Annex for a description).

1.7.4. Non-user funding

The leasing of space for services related to infrastructure use can also provide sources of revenues. These could include, among other elements, restaurants, motels and service stations alongside roads, and stores, food outlets and parking lots associated with railway stations. This financing source has considerable potential to provide revenues without necessarily adding "new" costs where the user or taxpayer is concerned.

A further source of non-user funding of road or rail infrastructure development involves taxing increases in property that a given project may bring about – in other words charging the beneficiary as opposed to the direct user. This creates a motive for the private sector, such as the construction industry or certain business sectors, to pay for having the infrastructure built. In the case of rail transport, for example, the areas located near stations can be prime property for both residential and business uses.

There are also examples where property developers have paid for parts of the cost of building road infrastructure (Nilsson, 1990). Moreover, Copenhagen has recently financed the extension of its metro system by way of exploiting unused land for industry and housing development purposes.

1.8. Division of responsibilities

Section 1.3 outlined the wide range of tasks associated with the provision of land transport infrastructure. It noted that some of these are fundamentally indivisible from government, while others may be delegated, and that the extent to which this delegation occurs is what differentiates the various models from one another.

Table 1.1 provides a broad overview of how principal responsibilities, including financing, are typically shared in each of the models discussed above. In all models, establishing broad policy directions that lay the foundation for the model will always be a sovereign task, as will be ongoing regulation.

It is also important to note that, even in those models where government retains full responsibility for the entire process there is still a need to share responsibilities among different public entities, in order to ensure the existence of some degree of oversight of the infrastructure provider. For example, if infrastructure provision is the responsibility of a ministry or state agency, some of these responsibilities will remain with other government bodies; for example, responsibility for establishing aggregate expenditure will likely reside with the finance ministry, as well as the cabinet and parliament.

Table 1.1. **Assignment of responsibilities for the tasks associated with the provision of infrastructure under different models**

Infrastructure provider → / Areas of responsibility ↓	Ministry	Agency	State corporation	PPPs	Not-for-profit corporation	Full privatisation
Establishing policy	Government[(a)]	Government	Government	Government	Government	Government
Determining aggregate expenditure	Government	Government	Corporation/ Government[(b)]	Government and Corporation/ SPV[(c)]	Corporation/ Government[(d)]	Corporation/ Government[(d)]
Allocation of expenditure	Government	Agency/ Government	Corporation/ Government[(b)]	Corporation/ Government[(d)]	Corporation/ Government[(d)]	Corporation/ Government[(d)]
Investment appraisal	Ministry[(a)]	Agency[(a)]	Corporation	Corporation/ SPV[(c)]	Corporation	Corporation
Infrastructure delivery(e)	Ministry	Agency	Corporation	Corporation/ SPV[(c)]	Corporation	Corporation
Operation and maintenance(e)	Ministry	Agency	Corporation	Corporation/ SPV[(c)]	Corporation	Corporation
Financing	Government	Government	Corporation/ Government[(f)]	Government/ Corporation[(g)]	Corporation/ Government[(f)]	Corporation/ Government[(f)]
Regulation	Government	Government	Government	Government	Government	Government
Charging for infrastructure use	Government	Government	Corporation/ Government[(g)]	Government/ Corporation/ SPV[(b) (g)]	Corporation/ Government[(f)]	Corporation/ Government[(d)]

Source: Adapted from Adams *et al.*, 1998.

Note: (a) In the case of ministries or agencies, various of the responsibilities are retained by other areas of government, such as finance ministries or cabinet.

(b) Corporate plans of state corporations are typically approved by government, including the capital plan. This is obviously the case if government is the only shareholder.

(c) Depending on the PPP design, there may or may not be an SPV.

(d) To the extent that rate regulation or investment review impact on the aggregate expenditures and investment decisions.

(e) These activities may be contracted out by the responsible entity, all or in part.

(f) To the extent that rate regulation or control prevails.

(g) Depending on whether financing is outsourced, and if there is direct tolling, shadow tolls, availability payments, etc.

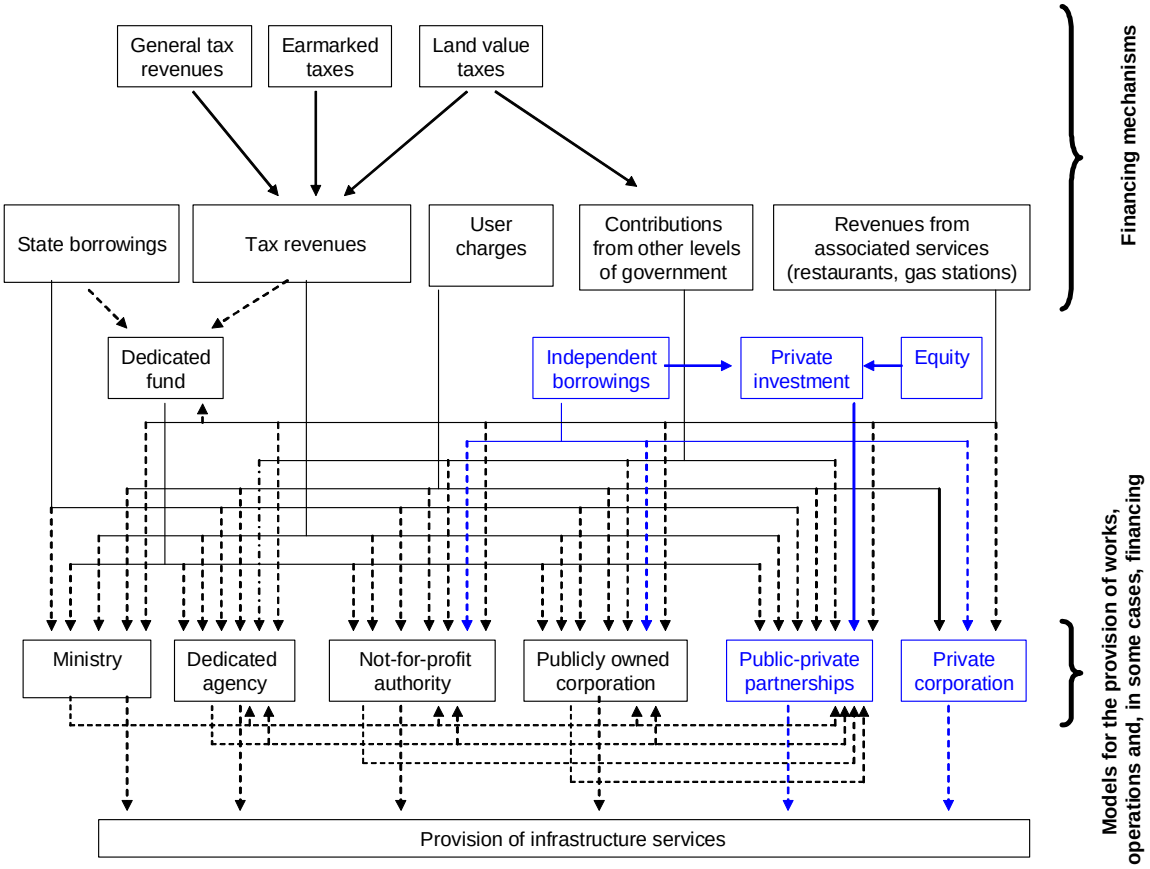
1.9. Summary

This chapter has provided an overview of the principal models employed for carrying out the operational tasks associated with the provision of infrastructure, including financing. It has also discussed the implications for these models of the various means of channelling taxpayers' money and user charges into infrastructure.

Figure 1.5 provides a schematic outline combining the various models and sources described above. It shows a downward flow of resources beginning with initial sources of financing, through the various models for development, maintenance and operation, and finally to the infrastructure itself. The dotted lines indicate where a given flow is one of various options available. Private capital is shown in blue. For example, user charges can be applied to any of the mechanisms noted on the figure,

but is only an option under most of the models. However, private corporations would typically be required to employ user charges in order to function.

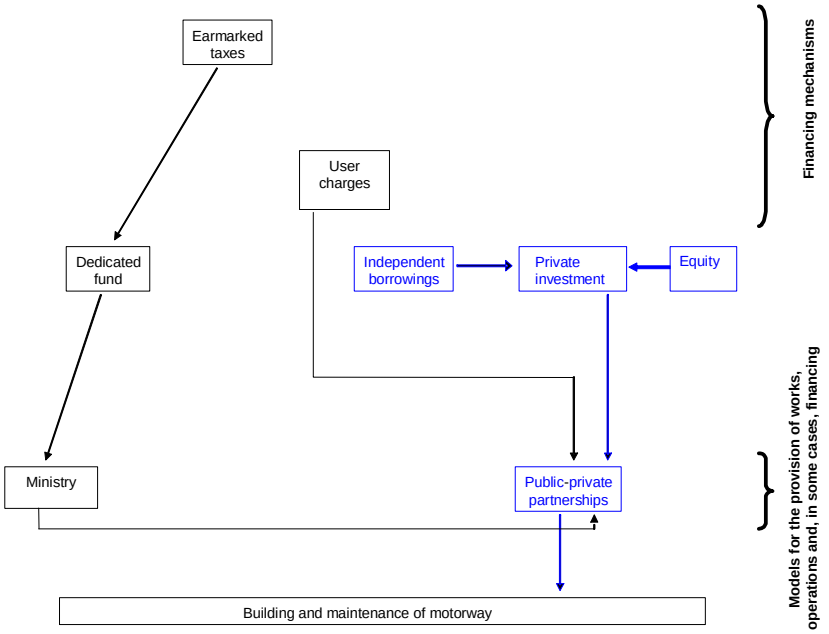
Figure 1.5. **A framework for the provision of surface transport infrastructure**



The figure illustrates the claim that the various financing mechanisms are not intrinsically linked to given models for the provision of infrastructure. It also reveals the complexity of the inter-relationships between these mechanisms and sources. In determining which means to use to provide given infrastructure, the options available to governments are obviously numerous. Furthermore, various models may be employed concurrently, even where the same infrastructure is concerned.

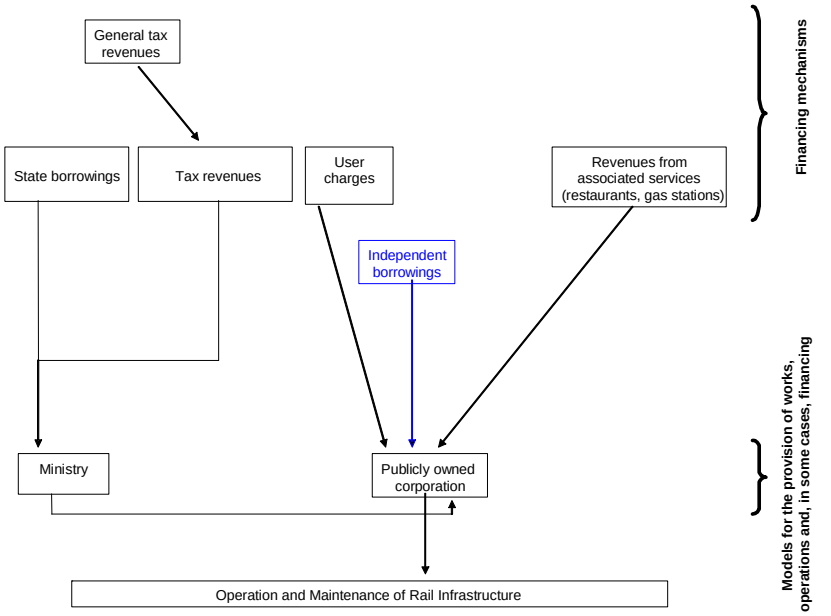
As one example, a given motorway may be provided by a PPP employing private borrowing and remuneration from tolls, as well as public subsidies based on earmarked fuel taxes. This is shown in Figure 1.6.

Figure 1.6. **Hypothetical example of motorway provision: PPP with private borrowing, tolling and public subsidies based on earmarked fuel taxes**



In another, a publicly owned rail infrastructure provider may employ public subsidies originating with government borrowing and tax revenues, as well as user charges from rail operators, which, in turn, receive revenues from users and public subsidies, as well as from space rented to shops and restaurants in stations, and from vehicle parking. This is shown in Figure 1.7.

Figure 1.7. **Hypothetical example of rail infrastructure financing with public subsidies based on general borrowing and taxation, as well as user charging**



Clearly, the permutations are many. The final model employed must be chosen carefully based on the needs and circumstances surrounding that infrastructure. This is the subject of later sections.

KEY CONCLUSIONS

- The overall provision of adequate surface transport infrastructure to meet society's needs is a key government responsibility. However, this does not imply that all elements of this task must be carried out by governments.

- The task of providing infrastructure involves many elements, including those associated with planning and administration, oversight, financing, works and operation. Some of the tasks are *sovereign* – meaning that they are fundamentally government responsibilities that cannot be divested, largely because they involve ensuring that the overall provision of infrastructure is carried out appropriately and according to principles of good governance. Other tasks are *operational*, meaning that they can be divested to organisations that are not under the direct control of government.

- In divesting operational tasks associated with the provision of surface transport infrastructure, governments have two basic options: devolution of responsibilities to specific corporate entities that are independent of government in their decision making; or outsourcing specific responsibilities, which includes the use of public-private partnerships (PPPs).

- Financing – the provision of money at a time and in the quantity needed to meet society's infrastructure needs – is a fundamental element of the overall task of providing surface transport infrastructure.

- Deciding how much resources should be dedicated to financing infrastructure, and to which specific modes and projects, is a sovereign task. However, raising funds for specific initiatives by way of borrowing or user charging is an operational task that can be delegated.

- There are ultimately two primary sources of financing – the user and the taxpayer. The choice of which source(s) to employ is, for the most part, independent of the model used to provide infrastructure. However, it has profound implications for the functioning of that model, including on the availability of financing and the use of the infrastructure. Making this choice is a key sovereign task that must be undertaken prior to the design of the model to be employed for providing the infrastructure.

- The instruments by which tax revenues and user charges can be channelled into spending on infrastructure include public subsidies, public and private borrowing, user charging, and revenues from activities and property associated with the infrastructure.

- For the most part, no particular financing source or instrument is specific to the model employed for providing infrastructure. Thus, a wide variety of options is available to government, which must be carefully selected based on the specific infrastructure need in question.

- Whatever the models chosen for providing and financing infrastructure, government will retain key responsibilities, particularly with regard to establishing the policy frameworks under which financing occurs, and regulating this activity. However, the nature of government's role will be fundamentally transformed by the use of alternative financing, and government must develop appropriate structures to manage this.

2. INTERNATIONAL EXPERIENCES

2.1. Introduction

The previous chapter outlined various models employed for providing surface transport infrastructure. The present chapter provides an overview of how infrastructure is presently provided in different countries.

As background Section 2.2 discusses future transport needs. Section 2.3 describes governments' search for new models for providing infrastructure, while Section 2.4 considers overall experience to date in this area. Road, rail and inland waterway issues are considered in Sections 2.5 to 2.7. The Annex includes a number of case studies that provide more details regarding some of the examples discussed in this chapter.

2.2. Future international funding needs

There are initially two key drivers for infrastructure investment requirements. One is the existing stock of infrastructure, which creates a demand for periodic renewal. The second is GDP growth which, in turn, is a function of such factors as population increase, per capita income and productivity growth.

Many projections have been made claiming that the need to renew the current large stock of infrastructure in combination with growing demand is creating substantial pressure to invest in transport infrastructure. Virtuosity Consulting (2006), for instance, suggests that, while 0.27% of world GDP was used for investment in roads and railways in 2000, the demand will be 0.40% in 2010, 0.34% in 2020 and 0.30% in 2030. As small as the proportions may seem, they represent enormous amounts of money.

There are, of course, many caveats behind these estimates. In particular, the demand for new infrastructure capacity will be affected by a number of other aspects. Demographic factors, including population change, migration and, in particular, people's mobility and choice of where to live and work, are important determinants. For example, a shift in population concentrations from rural to urban areas also creates a demand for commuting, which may, in turn, affect the modal split, and shift the need for road and rail investment, respectively.

Trade patterns will also play a key role. The growth of emerging economies is already altering the spatial organisation of trade, with resulting impacts on transport systems. One consequence is congestion in certain ports and surface networks that bear the brunt of growing trade with China. The result for governments may be a need to strategically enhance infrastructure in areas most affected by new trade patterns.

However, even there, emerging trends may have very different implications for the various modes. For example, recent analysis has shown important decreases in the weight/value ratio of trade. Vertical specialisation is also increasing trade in inputs for manufacturing. Timeliness in transport is an increasingly essential factor, partially driven by consumers' tastes, especially where high-value products are concerned. These tendencies, together, indicate increased room for aviation in trade. To

illustrate this argument, 1/3 of the *value* of US imports in 2004 was shipped by air, although the maritime mode continues to dominate when measuring by tonnage (Hummels, 2006; see also Rothengatter, 2006). Trends such as these, if they continue, have important implications for land-side infrastructure connections.

Another determinant concerns the relative growth in passenger and freight transport. Since heavy road vehicles require a higher-standard – *i.e.* "thicker" – road, the growth rate of freight transport is particularly important where cost expansion is concerned. For railways, it may be the other way round; freight-only railways may require good groundwork, but do not have the same demand for straight lines as high-speed passenger trains, and, because of lower speeds, may also be less expensive to maintain.

The single most important determinant of future demand for investment funds, however, will be governments' choice of pricing policies. Apart from influencing the amount of financing available for given infrastructure, different levels of user charges, such as fuel taxes and tolling, create different traffic volumes and traffic growth rates. Congestion charges in Singapore, London and Stockholm, and the kilometre charge levied on German and Austrian motorways illustrate the potential of the pricing instrument.

All of this indicates that the exact demand for future investment in land transport infrastructure is impossible to predict, particularly on a mode-by-mode basis. It is still obvious that governments in most countries will face high pressure to maintain and expand the supply of infrastructure in the future, with a particular focus on key, strategic areas.

2.3. The situation today – The search for new solutions

Since at least the middle of the 20th Century, most road transport infrastructure in most countries has been paid for out of general revenues, funded by taxes and public borrowing. In the rail sector, carrier service providers have traditionally paid for infrastructure through user charges, although, in many parts of the world, they are also substantially subsidised by government.

Especially since the late 1970s, governments have looked for innovative ways of providing surface transport – and other – infrastructure. This has, in particular, included stimulating further engagement of the private sector in the provision of infrastructure (OECD, 2002).

The search for alternative models is often justified based on a belief that current financing systems are insufficient to meet development and maintenance needs. For example, in introducing the most recent US highway funding legislation, the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: Legacy for Users* (SAFETEA-LU), which became law in August 2005, the Federal Highways Administration (FHWA) (2006a) notes:

> "To help close the gap between highway infrastructure investment needs and resources available from traditional sources, SAFETEA-LU includes … provisions which, in addition to tolling options …, will enhance innovative financing and encourage private sector investment …"

In the similar vein, the Australian Government's 2004 transport white paper stated:

> "All governments face difficulties funding land transport infrastructure from traditional budget sources. There are pressures from competing fiscal priorities. In addition, the costs of providing infrastructure are rising due to increases in land prices, increases in material and construction costs, the increased scale and complexity of projects and the associated cost of environmental

mitigation measures. Consequently, there is a need to consider how to increase private sector investment."

The reasons for this perceived "infrastructure gap" are complex. As well as the increase in demand discussed in Section 2.3 the costs associated with infrastructure provision may also have increased, partially as a result of factoring in externalities such as environmental costs. For example, building noise barriers or tunnels in city regions in order to reduce disturbances from traffic can greatly increase the costs of providing capacity.

Under fully public financing, infrastructure must compete with other policy priorities, some of which may be perceived as being more politically pressing. These include "new" priority areas, such as security in the post-September 11 era and the health care and pensions of the post-World War II "Baby Boom" generation, as well as traditional concerns, like education.

In many countries, the revenues from taxes associated with a given mode of transport – particularly taxes on fuel for automobiles – are greater than government's expenditures in that mode. In these countries, the road transport sector is therefore made an important source of general revenue funding. This implies that the perceived funding gap in road transport infrastructure may, in fact, be a shortfall in other priority areas, which have been cross-subsidised by the roads sector. However, this is difficult to truly ascertain unless the full costs of road transport use – including externalities – have been quantified, which is almost never the case. At the same time, there is often a desire to subsidise other modes – notably rail, given its perceived social benefits.

Most of these problems also exist in developing countries, where, in addition, infrastructure must often be created or upgraded to meet the needs of quickly growing populations and accommodate economic development. Meanwhile, public funds are scarce. The high economic growth in some countries – such as China and India – means that the needs for new infrastructure are especially great.

An additional background aspect for the growth of alternative models for infrastructure is worth noting. Pension fund managers sit on enormous amounts of money that they want to invest in assets with long time horizons and reasonably stable returns. This itself does not justify creating PPPs and other models, but it may increase the feasibility of, and interest in such initiatives.

With this as background, many governments have pursued the use of various "innovative" alternative models, sometimes as part of a concerted policy focusing on infrastructure in general or given modes in particular, and sometimes on a piecemeal basis. The reasons specifically provided for these actions can often be boiled down to three:

1. To access new sources of financing for infrastructure.

2. To borrow for infrastructure without this impacting on the public deficit and debt.

3. To improve the efficiency with which infrastructure is provided.

As discussion in other chapters will further highlight, a key assumption in this report is that the third reason should be the basis of decision-making where the use of different models for the provision of transport is concerned – to optimise the use of scarce resources by applying the greatest possible efficiency to the provision of infrastructure.

2.4 Experience to date with different models

Chapter 1 noted that governments' efforts to improve the provision of surface transport infrastructure have focused on two different means: *outsourcing* and *devolution*. Both have been prominent as governments have sought to address budget pressures and the need to continue funding infrastructure, as the following pages will attest.

Over recent decades, some governments have engaged in wholesale devolution of entire networks. This has gone farthest in rail, where some countries have fully privatised entire networks, while most developed countries employ state-owned enterprises. In roads, many countries have concentrated works in an agency, as opposed to an overall transport ministry. Others have gone farther, transferring certain networks – typically motorways – to independent providers, such as mixed public-private companies, state-owned companies, or private concessionaires.

Outsourcing is increasingly common as well, and often combines with devolution. To begin with, in developed countries, agencies and ministries responsible for roads contract out, on a piecemeal basis, most works. Private or quasi-private infrastructure providers are likely to do the same. Furthermore, there is a growing experience of much more complex outsourcing arrangements, including Design-Build and PPPs, mainly focusing on motorways, bridges, tunnels, and specific rail links.

For various reasons, it is difficult to quantify the exact extent to which the different models for infrastructure provision are currently playing a role in the surface transport sector.

For a start, the literature reveals a lack of consistency in the terminology regarding what constitutes a PPP and privatisation, which makes data difficult to compare. Data that discusses "private investment in infrastructure" as an aggregate does not indicate whether this occurs via PPPs or outright privatisation, or bonds floated by government, and PPPs may also be publicly financed. Thus, the full extent of the phenomenon is difficult to quantify, although anecdotal evidence gives an idea of increasing prominence of a wide range of models.

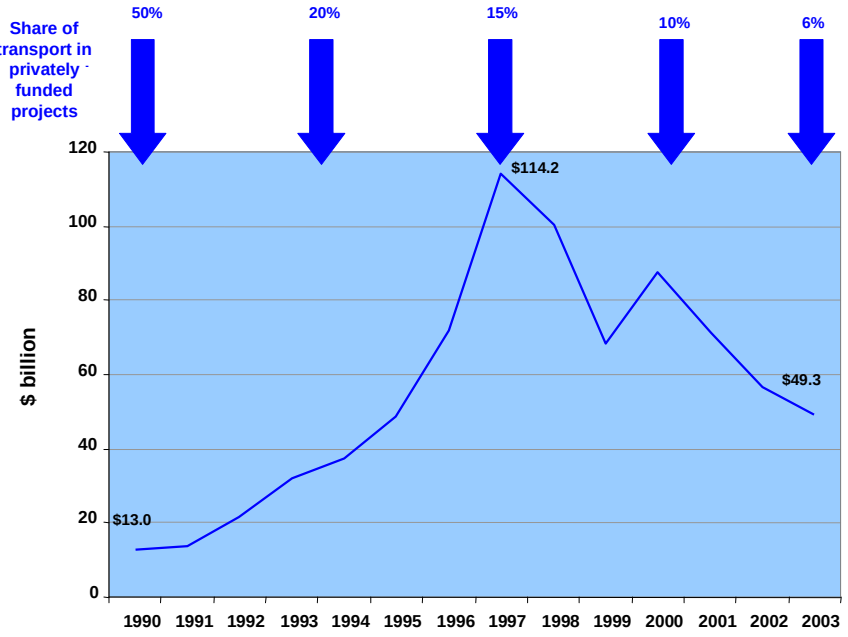
Furthermore, the use of PPPs and other models is clearly a dynamic phenomenon, and one that is relatively recent. Indeed, the mid-1990s actually saw an important drop-off in the use of PPPs worldwide, following a great rise at the beginning of that decade (Virtuosity Consulting, 2005). This is demonstrated by Figure 2.1, showing the value of commitments to projects with private sector financing world-wide, as well as the percentage of these that involved transport.

Virtuosity Consulting (2005) suggests that the reason for this may be that, following initial enthusiasm, many countries came to terms with the realities of PPPs, realising that private financing came with a cost, that appropriate regulatory reforms were required, and that PPPs did not necessarily increase users' willingness to pay charges. This does not imply a rejection of PPPs as an option, but rather a more cautious approach. Estache and Serebrinsky (2004) note the impact of the 1997 Asian financial crisis, and the implication that the PPP market is highly susceptible to financial instability.

Estache and Serebrinsky also suggest that PPPs may be going through an evolution similar to that of the development of railways in the UK beginning in the 19th Century and throughout the 20th Century. In that case, initial private investment occurred on a piecemeal basis, and was eventually replaced by long-distance operators dominating the sector and providing services of vital importance to the national economy. This led to concerns about market concentration. Furthermore, exogenous shocks in the 1940s led to financial instability in private firms, and thus nationalisation. Reforms occurred in the 1950s focusing on reducing the overall supply to meet demand, and further reforms in

the 1990s sought to reduce the fiscal burden on the state by deregulation and privatisation. However, limitations were then perceived with regard to the private sector's ability to meet some public policy objectives – such as those related to safety and the environment – leading to a partial re-engagement by government, and more hybrid models.

Figure 2.1. **Infrastructure projects with private sector commitments, 1990-2003**



Source: World Bank Public-Private Participation Infrastructure Database.

In any event, it is safe to say that the PPP concept, whatever its precise definition, has become pervasive in public discourse in recent decades. At the same time, there are countries that are clear leaders in this field, and others where such arrangements are largely unknown. Table 2.1 shows a clear preponderance of rail and road PPPs in Europe, first and foremost, followed by Asia and the Pacific, and North America. Furthermore, anecdotal evidence shows that, even in those regions, there are countries that are very active and others where PPPs are virtually unknown.

In developing and transition countries, Virtuosity Consulting (2005) notes that, between 1990 and 2000, 2 500 infrastructure projects involved private participation, with project commitments of USD 750 billion. Transport accounted for 27% of these and 18% of funding, with toll roads being the most prominent. However, some caution is called for; Plessis-Fraissard (2006) notes that, by 2004, only 55% of proposed road transport PPPs worldwide had achieved funding, while Table 2.1 as shows an important discrepancy between planned and executed projects.

Furthermore, Estache and Serebrinsky note that, where developing countries are concerned, China, Brazil, Argentina, Mexico and Malaysia were the great leaders, and that Africa, the Middle East and South Asia were particularly under-represented. Table 2.1 shows that, by value, Africa accounted for only 2% of road PPPs and 0.1% of rail PPPs in the period 1985-2005. Projects in Latin America and the Caribbean were also relatively few, while Europe was by far the dominant market.

Table 2.1. **Cumulative funded PPPs by region and mode – 1985-2005**

Region	Roads		Rail	
	Projects No. (% of world)	**Value USD M (% of world)**	**Projects No. (% of world)**	**Value USD M (% of world)**
Europe				
Planned+Funded Projects	252 (33%)	160 166 (42%)	68 (27%)	114 201 (42%)
Funded Projects	106 (27%)	68 329 (39%)	43 (38%)	74 133 (51%)
North America				
Planned+Funded Projects	221 (29%)	100 950 (26%)	39 (15%)	34 062 (12%)
Funded Projects	112 (29%)	35 871 (20%)	17 (15%)	14 361 (9%)
Asia and Far East				
Planned+Funded Projects	145 (19%)	89 455 (23%)	85 (33%)	99 393 (36%)
Funded Projects	79 (20%)	50 039 (28%)	30 (27%)	48 842 (34%)
Latin America and the Caribbean				
Planned+Funded Projects	132 (17%)	28 725 (8%)	47 (18%)	20 434 (8%)
Funded Projects	85 (22%)	19 474 (11%)	22 (19%)	7 189 (5%)
Africa and Middle East				
Planned+Funded Projects	14 (2%)	4 796 (1%)	16 (7%)	5 630 (2%)
Funded Projects	7 (2%)	3 656 (2%)	1 (1%)	168 (0.1%)
Worldwide				
Planned+Funded Projects	764 (100%)	384 092 (100%)	255 (100%)	273 720 (100%)
Funded Projects	389 (100%)	177 369 (100%)	113 (100%)	144 693 (100%)

Source: Public Works Financing (2005).

Note: Includes some instances where similar projects are grouped under a single project name but still counted as more than one project.

There are also important differences between the modes. Roads have attracted the greatest amounts of investments and projects. This is also seen in Table 2.1.

A key point where PPPs are concerned is that they are a relatively new phenomenon. This, combined with the long time-horizons of these arrangements, means that there is very little – if any – thorough ex post analysis available regarding the functioning of existing instruments, and the extent to which they have been successful in delivering value for money compared to other options. This issue is discussed in greater detail in Section 5.4. Of course, there is a growing amount of anecdotal evidence, which is feeding into the design of new PPPs.

It is well known that there have been some spectacular and costly PPP failures. These have often involved poor conceptualisation and planning of the project, particularly failures in project realism and preparation, in the provision of the necessary regulatory and legal framework, insufficient bidder expertise, and, sometimes, the strength of local financial markets. Areas where planning has particularly failed on various occasions include in the assessment of demand, and of the public's willingness to pay tolls, both of which are closely related (KPMG, 2005). One recurrent aspect of these contracts is the high incidence of renegotiation. Often, this has been triggered by opportunistic motives, i.e. that one party has used aspects of the contract design to its own advantage.

While this discussion is primarily descriptive, the following chapters are intended to analyse the pros and cons of the different approaches.

2.5. Roads

2.5.1. An overview of the road sector

Most roads in most countries are directly provided, maintained and operated by governments. Many of these are under the responsibility of municipal and state or provincial governments. Ministries and agencies typically carry the prime responsibility and there is a high degree of outsourcing of distinct tasks, especially in industrialised countries.

The dominant way to pay for road infrastructure provision is by allocations from government budgets. During the annual budget process, resources are allocated to different parts of the public sector, including to roads. Separate from this, governments decide how to raise revenue by charging and taxing activities in different parts of society, including taxes on activities related to road use.

With few exceptions, such as the US and Japan, most countries do not directly link expenditures to revenues raised in the same sector. As discussed above, road-related taxes are often greater than spending on roads, meaning that they provide an important source of funding for governments to use on completely unrelated priorities. It should, at the same time, be acknowledged that the full costs associated with the use of any transport mode, including roads, are seldom fully quantified. It is therefore not obvious what the balance between social costs and benefits would be, if it could be estimated.

Any international comparison of spending on, and revenue from the use of infrastructure is by nature uncertain. Two main problems are particularly pertinent. One is related to the different tiers – central, regional and local – of government. Differences in responsibilities across these levels make it difficult to know whether all relevant information about spending and/or revenue is available, in particular since the duties given to the respective tiers may differ across countries. The second problem is that countries may differ in their definition of certain concepts. Often, spending on investment is paid for during the year that resources are used, but some countries have an active balance sheet with annual down payments of initial loans. Furthermore, the distinction between, in particular, reinvestment and new investment is often imprecise.

With these caveats in mind, Table 2.2 summarises the proportions of revenue collected from different sources within the road sector in some EU countries. Although there is significant variance among countries, an average of 66% of revenue emanated from fuel taxes and 17% from taxes on vehicle ownership. Revenues from the roads sector average 3% of GDP in these countries.

Similar information from a different source – the International Road Federation's World Road Statistics (IRF, 2004) – is summarised in Table 2.3, which provides information on the significance of revenue from the roads sector seen in the perspective of aggregate public-sector tax revenue. These taxes on average provide some 7% of total revenue, but the spread is substantial, with less than 1% (Luxembourg) being the minimum value and 18% (France) the maximum. Notably, there are discrepancies between the data sources of Tables 2.2 and 2.3.

In Europe, revenues derived from road users greatly exceed spending in the sector, by 2-to-1 on average in Western Europe and by up to 3-to-1 in some countries.

The high degree of road funding that is derived from fuel taxes may be one rationale for why most roads are not tolled in most countries. If the public thinks that roads have already been paid for by way of fuel taxes, they will be reluctant to pay again in the form of tolls. A further argument against user charging is that the public road network is perceived as a public good, and that there are

efficiency motives for not charging for the use of non-congested highways. This argument is further developed in Chapter 7.

Table 2.2. **Shares of revenue from road-related taxes and fees in European countries, 1998 (%)**

Country	Vignettes	Tolls	Fuel Tax	Vehicle Tax	Sale or Registration Fee	Other	Insurance	Road Revenues as % of GDP
Austria	6	5	60	19	9	0	0	3
Belgium	2	0	57	20	5	1	14	3
Denmark	0	1	26	16	53	0	4	3
Finland	0	0	60	28	12	0	0	3
France	0	15	67	18	0	0		3
Germany	1	0	78	21	0	0	0	2
Great Britain	0	1	80	19	0	0	0	4
Greece	0	26	54	5	14	0	0	5
Hungary	0	8	84	2	0	5	0	4
Ireland	0	1	51	16	32	0	0	3
Italy	0	8	75	14	0	0	3	4
Luxembourg	1	0	90	7	0	0	2	2
Netherlands	1	0	53	20	26	0	0	3
Portugal	1	9	61	27	0	2	0	4
Spain	0	8	73	11	8	0	0	3
Switzerland	6	0	67	24	0	3	0	2
Sweden	1	0	82	16	1	0	0	2
Average Share	1	5	66	17	9	1	1	3

Source: The Unite Project, EC (Compiled in Lindberg and Nilsson, 2005).

Note: These numbers emanate from Unite, a project funded by the European Commission. Much effort was spent on eliminating the measurement problems mentioned in the main text.

There are, however, important examples where efforts are made to draw a direct link between road-related taxes and charges and spending on roads. The US, for instance, funds roads from federal taxes related to road transport (mainly fuel taxes) channelled through a road fund. Allocations are made from the fund for federal, state and local roads, as well as to public transport. The fundamental difference behind this and general budget funding is that there is a link, albeit not necessarily very strong, between what comes into the fund and the amount that can be spent. Further information about US road sector funding is provided in the Annex. Chapter 7 provides a discussion of earmarking specific tax revenues. Another country employing earmarking is Japan, based on laws dating from the 1950s.

The Annex also provides the example of an agency specifically established to manage earmarked funds in New Zealand. This concept is further described in Chapter 5. In New Zealand, this agency channels funding to another agency, which is responsible for works and which, in turn, outsources most activities to private companies. Various other countries have also established road funds managed by independent agencies, including based on the "Second Generation Road Funds" model developed by the World Bank. However, their governance structures and financing sources tend to vary, as does the means of actually executing works (see OECD and ECMT, 2007).

Many countries finance part of their road transport infrastructure through tolls. Table 2.2 indicates that Greece (26%), France (15%), Portugal (9%), Spain (8%) and Italy (8%) have a substantial share of their road-related revenue from tolls. Fuel taxes are, however, still the main source

of income in these countries. Furthermore, tolling does not necessarily mean that the proceeds are earmarked for roads, although that is often the case.

Table 2.3. **Road-related revenue and its components percentages**

Country	Year	Tax on purchase	Tax on ownership	Tax on use (fuel)	Toll	Other	Road revenues vs. all tax revenues
Austria	2002	8	24	53	13	2	2.9
Costa Rica	2002	58	12	0	2	28	n/a
Croatia	2002	19	3	13	10	55	5.2
Cypress	2002	7	1	29	0	63	5.9
Denmark	1999	49	19	29	0	3	5.5
Ecuador	2002	45	35	3	17	0	n/a
Ethiopia	2001	0	0	0	0	0	3.5
Finland	2002	20	10	64	0	6	14.5
France	2000	12	13	66	9	0	18.1
Ghana	2001	2.2	2.2	91.3	2.2	0	n/a
Georgia	2002	0	10.5	86	3.5	0	17
Great Britain	1999	15	13	61	0	11	10.6
Greece	1998	73	0	20	7	0	2.5
Hong Kong	1998	28	24	45	0	3	4.7
Iceland	2002	22	21	57	0	0	10.6
Ireland	2001	42	0	58	0	0	n/a
Italy	1999	14	10	16	1	59	n/a
Japan	2002	7	40	53	0	0	8.25
Kyrgyzstan	2002	0	11	89	0	0	2.6
Latvia	2002	0	16.5	83.5	0	0	n/a
Luxembourg	2002	0	100	0	0	0	0.5
Malta	2002	65	0	33.5	0	1.5	4.2
Mongolia	2002	11	0	89	0	0	n/a
Netherlands	1999	26	30	44	0	0	2.2
Norway	2002	28	17	43	9	3	4.9
Slovenia	2002	3	9	88	0	0	10.1
Sweden	2002	0	11	46	0	43	9.2
Switzerland	2002	12	19	66	0	3	6.4
Ukraine	2002	0	28	0	0	72	n/a
USA	2001	1	26	66	7	0	n/a

Source: Adapted from IRF (2004), World Road Statistics.

There is also a growing recognition that charging policies should be designed to internalise the negative consequences of road use, as well as to manage demand, *i.e.* to price congestion. The development of satellite and other technologies is increasing the options for making this a reality at national and international levels, although currently such network pricing is limited to certain routes, vehicles and areas. The European Union's Eurovignette Directive, for example, establishes minimum rates for vehicle taxation and a maximum level for a time-related charge and a distance-related toll, linked to the costs of constructing, operating and developing the infrastructure network (EC, 1999 and 2003). Austria, Germany and Switzerland, in particular, make use of a charge on heavy vehicle traffic.

Some cities – namely London, Singapore and Stockholm – have also introduced user-based congestion charging. However, as discussed in Chapter 7, true pricing of surface transport infrastructure directly related to its costs is still a long way off.

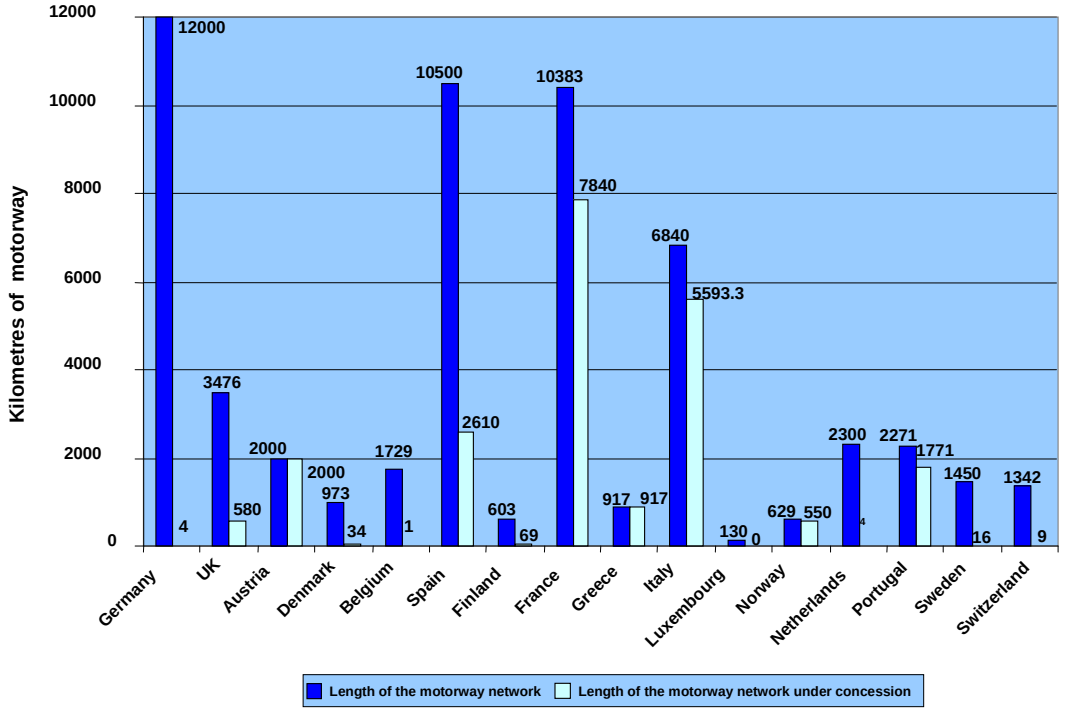
2.5.2. Alternative models in the road sector

Although most countries supply most of their road systems by way of ministries or agencies, and pay for them by employing resources from the public budget, there are also many instances where this is not the case. However, most alternative models for providing infrastructure involve roads that are high profile, or that provide a particularly high level of service, such as higher speeds, greater safety, less congestion, greater comfort, etc. In many cases, these are tolled, while in others governments directly fund the infrastructure provider, through such mechanisms as shadow tolls. Where routes are tolled, they are very often provided as an alternative to other, publicly provided, routes.

Figure 2.2 and Table 2.4, focussing on concessioned motorways in Europe, provide an insight into the great variety of practices that exist. Figure 2.2 shows that, while Belgium, Germany, the Netherlands, Sweden and Switzerland have all or most of their motorways provided directly by the government, Austria, France, Italy and Portugal concession out most of their motorways. The Austrian case, as discussed below and in the Annex, involves concessioning to a state-owned company.

The nature of these concessions also varies greatly. Table 2.4 shows that, in some countries, concessionaire companies are mainly or entirely public, while in others they are private. Italy, Norway and Spain have several different companies operating the concessions, while others, such as France, involve relatively few commercial firms. Other countries have only a minimum of concessioned infrastructure, essentially limited to a couple of specific projects. There is also considerable variety within countries over time, which is not shown here. Furthermore, it is important to recall that these data refer to motorways only, which, in terms of kilometres, represent a fairly minor – albeit essential – portion of overall road systems.

Figure 2.2. **Overview of European practices in motorway concessions (with or without toll)**



Source: Fayard (2006).

Table 2.4. **Highway concessions in Europe, as of 1 February 2004**

Country	Motorway Network (kms)	Network Under Concession (kms and %)	Concessionaire Companies			
			Public* (kms)	Private (kms and %)	No. of public*	No. of private
Austria	2 000	2 000 (100%)	2 000	0	3	0
Belgium	1 729	1.4a (0.1%)	1.4a	0	1	0
Denmark	973	34b (3%)	0	34b (3%)	2b	0
Finland	603	69 (11%)	0	69 (11%)	0	1
France	10 383	7 840 (76%)	6 940	900 (9%)	10c	4
Germany	12 000	4d (0.03%)	0	4d (0.03%)	0	1a
Greece	916.5	916.5 (100%)	916.5	0	1	0
Italy	6 840	5 593.3e (82%)	1 201.6	4 391.7 (64%)	7	17
Luxembourg	130	0	0	0	0	0
Norway	629	550f (87%)	550	0	26	0
Netherlands	2 300	4g (0.6%)	0	4g (0.6%)	0	2g
Portugal	2 271	1 771 (78%)	0	1 771 (78%)	0	11h
Spain	10 500	2 610 (25%)	112.6	2 497.4 (24%)	1	28
Sweden	1 450	16 (1%)	0	16 (1%)	0	1
Switzerland	1 341.9	8.85i (1%)	8.85i	0	1	0
UK	3 476	580 (17%)	0	580 (17%)	0	3

Source: Adapted from Fayard, 2005 (data from PIARC).

* "Public" means controlled by the state and/or a local government.

a. Liefkenshoek Tunnel.

b. Including 18 kilometres of the Great Belt Link Seeland and Funen and 16 kilometres of Oresund Link between Denmark and Sweden.

c. Figures include two international tunnel companies (ATMB and STRF).
d. Rostock Tunnel.
e. Including 30.2 kilometres of tunnels under concession.
f. The term "concession" is used in its broadest sense, as Norwegian companies have an exclusively revenue collection function.
g. Including 2 kilometres of Noord tunnel and 2 kilometres of Wijkertunnel (shadow tolls).
h. Including Lusoponte (operating two 24-kilometre-long bridges).
i. Grand Saint Bernard tunnel.

Motorway network concessions

Various countries have delegated responsibility for major sections of their motorway networks to concessionaires that are, to one extent or another, independent from government. Countries that have led in this field include Austria, France, Italy and Japan. In each case, different means are employed for financing the network.

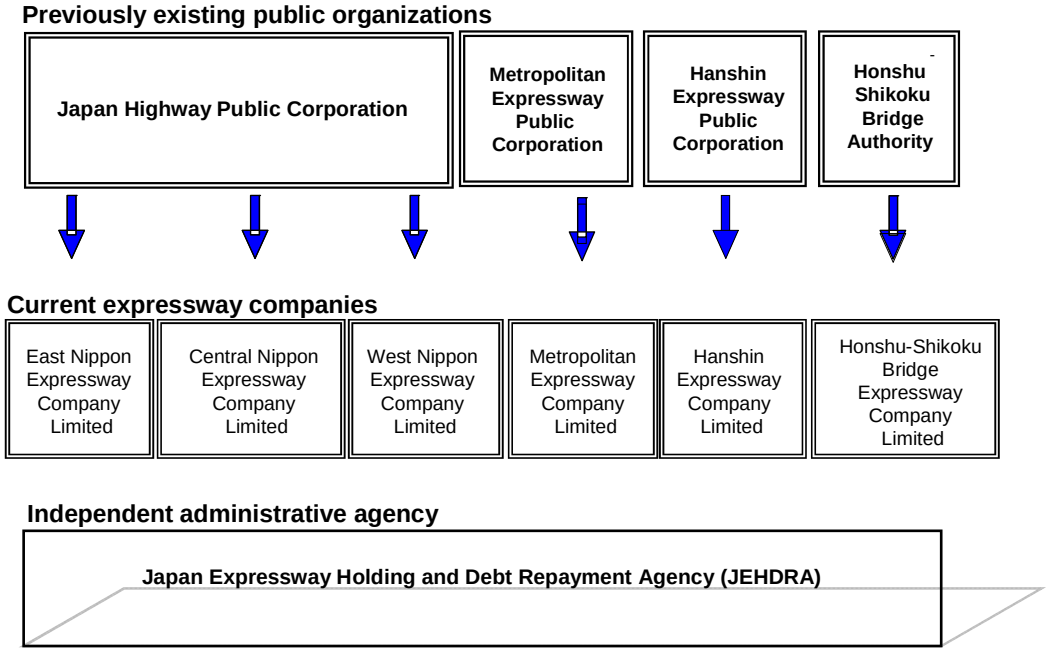
The French model has involved concessions with varying degrees of public intervention, including public ownership of concessionaires, since the motorway system was created in the 1950s. However, it is currently characterised by government divestiture of shares in infrastructure providers, and other measures, such as state-guaranteed loans. The French concessionaire companies collect tolls set as part of five-year agreements with the government. Furthermore, plans for operation and investment, and commitments to safety, environmental and social goals are established every fifth year. As it currently stands, road investment by concessionaire companies in France is greater than overall public investment in roads (Fayard *et al.*, 2005, see the Annex).

Italy's Autostrade was created in the 1950s as a state-owned enterprise. Some shares were first publicly sold in 1987, then the company was fully privatised in 1999. Autostrade currently holds concessions for 3 408 kilometres of road, or about half of the Italian motorway network, with the other half mostly under concession as well. Tolls are capped, based on an agreement with the government (see the Annex).

As described in the Annex, Portugal employs a range of different concession mechanisms across its primary motorway network and for key bridges, combining both direct tolling and shadow tolls. The organisation responsible for oversight of the network and PPP arrangements has also been devolved into a state-owned company.

Japan's motorway network was developed by four main public corporations from the 1950s onward. More recently, it was decided that these should be privatised, given their rising debts, which, collectively, had reached USD 350 billion (Morisugi, 2006). In 2005, six private motorway companies were established, which would lease assets from the newly created Japan Expressway Holding and Debt Repayment Agency (JEHDRA), an incorporated independent administrative agency of the Japanese government. This process is described in Figure 2.3. These firms pay rent to JEHDRA, while taking responsibility for constructing and managing expressways and for collecting tolls, based on approval from the Minister of Land, Infrastructure and Transport (MLIT). Meanwhile, JEHDRA will be responsible for holding the expressways and repaying debts over a 45-year period. The goal is to dissolve JEHDRA in 45 years, once the debt is paid, and then transfer the expressways back to government and local authorities, thus allowing for a toll-free and debt-free national expressway system (Morisugi, 2006).

Figure 2.3. **Privatisation of the Japanese Road network**



Source: Adapted from Morisugi, 2006.

Austria presents a different model, whereby the primary road network is managed by a 100% publicly owned company. This company, ASFINAG (Motorway and Expressway Financing Corporation), is responsible for construction, upgrading, operation, maintenance and tolling, although the right to set the tolls is retained by the Republic of Austria. ASFINAG does not get any grants from the federal budget; its operating income results exclusively from user fees that are legally tied to expenses in the network. ASFINAG is also making selective use of PPPs for elements of the network (see the Annex).

A different model of motorway network management is provided by the US. Revenues from federal fuel charges are earmarked to go into the Highway Trust Fund. State governments combine these federal allocations with revenue from other sources, including both state fuel taxes and general tax revenue, in order to build and maintain the network. Recent US appropriations legislation has encouraged the use of innovative mechanisms, including a number of special public instruments whereby public funds from the Highway Trust Fund may be employed to leverage private investment for specific infrastructure needs (see the Annex).

The above examples highlight that a number of models are in use around the world to provide road network infrastructure in a way that is independent from government control over fundamental operational tasks associated with the provision of road networks, including financing. Furthermore, while these are not likely to account for the majority of road infrastructure in any given country, they usually include very important roads that carry a high proportion of the country's traffic. At the same time, where such networks are tolled, they are often – but not always – accompanied by alternative routes that are not tolled.

PPP project financing

The previous section provides illustrations of how many countries organise larger or smaller networks of roads in non-traditional ways. There are also many examples where responsibilities for providing specific links are outsourced by way of PPPs. In particular, PPPs are most common on major motorways, as well as particular bridges and tunnels. Where they are employed, a number of different contracting models are used, some of which involve tolling and others that do not.

Referring back to Table 2.4, above, we noted that concessioning in some European countries is focused on a minimum of projects, while the rest of the motorway network is in public hands. PPPs are obviously an important means for supplying motorways in some countries, as seen by the percentage of the motorway network in the hands of private firms, notably in Italy (64%, including the major network concession described above), Portugal (78%), Spain (24%) and the UK (17%).

Again, this does not mean that PPPs provide most of the road network in these countries. However, they often provide key routes within that network, in terms of traffic use or strategic importance. This perhaps defines the current role of PPPs under most circumstances, where roads are concerned: They tend to provide high-profile and important, but not most, road infrastructure.

Building on the discussion in Section 2.4, and the data in Table 2.1, it is clear that there is a particular concentration of road PPPs in certain countries, and especially in Europe, although many more countries are expressing serious interest in them, and pursuing related initiatives. The Annex provides more detailed discussion regarding the experiences in Argentina, Austria, France, Germany, Hungary, Italy, Mexico, Portugal, Spain, the UK and the US, including their use of PPPs. However, there is enormous variation with regard to whether PPPs have focused on greenfield construction via BOTs or on the concessioning of existing routes, and whether these mechanisms play a key role or are peripherally used for occasional projects. The nature of financing and use of user charging has also varied immensely. Furthermore, the situations and policies in most countries are developing over time.

Australia has also seen a large proportion of PPP use in its transport system, as well as in other sectors. Notable examples are high-profile projects such as the Melbourne City Link, the Sydney Harbour Tunnel and Cross-City Tunnel, and a number of toll motorways.

In Latin America, the 1990s saw a major boom in motorway PPPs, primarily using BOT contracts. This is also discussed in the Annex, focusing particularly on Argentina and Mexico. Chile has been particularly active, and has developed some highly innovative mechanisms for sharing demand risk, which are described in Chapter 6.

In India, since 1990 there has been a move to encourage private involvement in motorway provision, based on perceived deficiencies in the system. However, after concerns regarding initial BOT schemes, there has been a preference for employing a fully funded annuity scheme, whereby the developer is paid by the government to cover the full costs over the concession period (World Bank, 2006).

The US has arrived relatively late to the world of motorway PPPs, partially because of its dependence on fuel taxes for fund roads, as described above. In 2004, the General Accounting Office (GAO) noted that 20 states did not legally permit private involvement in highway funding. Since then, the most recent federal legislation for the distribution of fuel taxes specifically noted the important role that could be played by innovative financing. Furthermore, a number of high-profile PPPs are either in place or are under consideration, such as the Dulles corridor and various other highways in Virginia; the SH 130 Tollway in Texas, etc. Some states have undertaken specific PPP initiatives, such

as Georgia, Oregon and Virginia. However, PPPs continue to represent a small proportion of the overall highway network, and a miniscule proportion of roads in general.

A final example is provided for contrast, showing that innovative mechanisms can be developed for specific links without private involvement, although this is rare. The Oresund Bridge between Denmark and Sweden, opened in 2000, is a public-public partnership. The bridge, which provides for both road and rail traffic, is operated and maintained by Oresundsbro Konsortiet, which is owned by the Danish and Swedish states, and was established based on a bilateral agreement between the two governments. The bridge's construction cost 20 billion Danish kroner, and was financed by loans raised on national and international capital markets, but guaranteed by both states. The company charges tolls to road users, and charges the national railways of both countries based on pre-established rates, with a view to ultimately paying all construction and operating costs (Oresundsbron Konsortiet, 2006).

2.6. Rail

The situation with regard to the provision of rail infrastructure is vastly different from that of roads. This is due to how the sectors are organised, and how services are delivered in each. Thompson wrote on this in 2007, and much of the following analysis is based on that work.

Roads are characterised by their ubiquity, as well as their openness to users – including private individuals and firms – who employ their own means of travel. Anyone with the economic means can use their vehicle to transport themselves or their goods on publicly or privately provided roads. Rail, on the other hand, most often involves large-scale service providers transporting individuals and/or companies' products. Furthermore, the number of carriers that can use the same track at the same time is much more limited than on roads. The overall result of this is that rail provision generally requires large-scale carriers operating on extensive networks.

A railway consists in the most general terms of infrastructure and operating assets, such as locomotives, freight wagons and passenger coaches. An important point of departure for the present report is that the separation of infrastructure from operations is not at all as obvious as in the road sector.

The model chosen for providing rail services is greatly dependent on the sector's organisation. The business structure of railways can typically be classified under three separate headings:

1. *Vertical integration:* Infrastructure and all operating services are run under unified control (the "monolith" organisation).

2. *The owner-tenant model:* The dominant operator remains integrated with the infrastructure, and minority, tenant operators pay for their access to the infrastructure.

3. *Vertically separation:* The infrastructure is separated from the operator(s). This can comprise either separation in the accounts within one organisation or an actual institutional separation with (at least) two judicial partners negotiating with each other. For example, there could be a single infrastructure operator, with separate freight and passenger operators. There could also be a virtually unlimited number of operators competing *on* tracks or *for* access to tracks.

These organisational structures have important implications for infrastructure financing. To begin with, where structures are vertically integrated, there is a dedicated source of payment for infrastructure, via carrier services. On the other hand, where there is vertical separation, it is easier to

see the extent to which the costs of infrastructure are genuinely being met. It is conceivable that a vertically integrated entity could save costs by not investing sufficiently in the infrastructure assets.

A further key factor is the main orientation of the rail system. Many railways are first and foremost used for freight services (*e.g.* Canada and the US) or for passenger transport (Japan), while others have a mixed composition of services (Austria and Sweden). Each composition of demand places different requirements on the way in which the system is operated. Even if one or the other category dominates, they typically share track.

While road infrastructure, by and large, is the responsibility of the public sector, the pattern of ownership is much more mixed in the railway sector. For instance, full privatisation and state-owned enterprises are common where rail is concerned. In some parts of the world, especially developing countries, rail ministries dominate. PPPs are used sporadically, as we will see.

Each model requires some degree of oversight to ensure that the public interest is protected, and that the overall objectives of the model are met, including such issues as competition, safety and environmental sustainability. This question is considered more in Chapter 8, but it suffices to say here that models with a high degree of independence and control require strong regulatory structures.

2.6.1. Network operators

Private freight railways that own the infrastructure they use (Model 1, above) dominate in North America, and passenger service is largely provided by public companies (Model 2). The US freight railways have typically been owned and operated by private companies. Furthermore, the North American continent has experienced a general deregulation in recent decades, with a view to achieving greater efficiencies. This has also opened up for a rationalisation of the overall network. The continent has also seen a growth in smaller (Class II) operators. The largest Canadian railway (CN) was privatised in 1996 (see the Annex). Access to track is provided by integrated owner-operators on a fee-for-service basis (Model 2), and access rates are either negotiated or regulated to prevent abuse of monopoly powers.

The dominance of private ownership provides benefits in terms of productivity. Existing private freight organisations are self-sufficient, generating revenues and borrowing as any other company would, with the exception that there is some degree of price regulation. Again, the deregulation mentioned above has allowed North American operators more leeway in terms of the management of infrastructure according to business principles.

Following concessioning of freight and passenger railways in the 1990s, private companies also dominate throughout much of Latin America. The break-up of Japanese National Railways (JNR) in 1987 also led to the privatisation of its three largest elements – the East, West and Central Japan Railways – creating some of the largest passenger operators in the world, which are also vertically integrated (Model 1). The Japanese National Freight Railway, which is public, operates over the track of the private companies (Model 2).

In Europe, railways were, for many years, owned and operated by public sector companies according to Model 1 above. The break-up of Sweden's railways in 1988 and the vertical separation in the UK in the mid-1990s were the first examples of Model 3 coming into use. Vertical separation is today common throughout the continent. Table 2.5 provides an overview of rail organisation in different European countries as of 2005.

The UK has experimented with privatisation of rail infrastructure. An initial experiment with full privatisation began in 1994, under Railtrack, a publicly traded company. The new company was subsequently criticised for overall performance, including safety, and experienced financial difficulties. Railtrack was replaced in 2002 by a private, "not-for-dividend" company, Network Rail. Network Rail is a private organisation that operates as a commercial business, without shareholders. It is accountable to its members, who are drawn from the rail industry and the general public, and who do not receive dividends or share capital. All of Network Rail's profits are reinvested into maintaining and upgrading the rail infrastructure. As a private company, it can borrow funds (see www.networkrail.co.uk).

There is also a trend toward the franchising of passenger services in some EU countries (e.g. Germany, Netherlands, Denmark and Sweden) which enlarges the role of the private sector, at least in operations if not in infrastructure. Franchising contracts are typically for services that are not commercially viable but where governments, for different reasons, want to provide subsidies in order to maintain traffic.

The Australian Rail Track Corporation (ARTC) was established in 1998 by the central government, with the government, represented by the Minister for Finance and the Minister for Transport and Regional Services, as its sole shareholder and with agreement from the states. It is an arms-length provider of track services and leases track that is owned by several of the state governments to provide an interstate network of standard gauge track. Carrier services are provided by privately owned companies, some of which have state government ownership. The Commonwealth (central) government has invested roughly AUD 1 billion in ARTC in recent years for track upgrading, in keeping with overall policy goals to promote greater use of rail.

The various ownership and operating options for rail have emerged over time in response to changing perceptions as to what railways ought to do and how they should do it. The structural options have developed in line with increasing complexity in the markets and the purposes served. The following aspects have, to a larger or smaller degree, affected this development.

Economic efficiency

Most expert analyses of railway economics agree that there are no particular benefits of system size beyond a relatively small level of a few thousand kilometres of lines. There are, however, increasing returns to traffic density on a specific line. This has encouraged railways to share the same infrastructure. There are examples of freight operators competing in the same final market on a common infrastructure. More common are examples of different services using the same infrastructure. In this way, freight and passenger services can hold down their infrastructure costs.

Competition and market focus

When railways began, customer options and competition in both the freight and passenger markets were limited, and a monolithic model supported by high prices was possible. With the competitive pressure from other modes consistently growing, it has become harder for monolithic railways to compete with other modes in both the freight and passenger markets. Separation of infrastructure from operations has, at least in some cases, enhanced market focus.

There are a number of countries in which the possibility of rail-versus-rail competition (as opposed to inter-modal competition) is seen as a significant tool in limiting the potential market power of railways, especially in the freight market. In the US, this has taken the form of control over mergers

and of enforced access rights to retain competition that might otherwise be eliminated through mergers.

Table 2.5. Rail industry structure and regulatory arrangements in Europe

Country	Industry Structure
Austria	**E**
Belgium	**I**
Bulgaria	**S**
Czech Rep.	**S**
Denmark	**S**
Estonia	**I (freight)**
Finland	**S**
France	**S**
Germany	I
Greece	I
Hungary	I
Ireland	I
Italy	I
Latvia	I
Lithuania	I
Luxembourg	I
Netherlands	S
Norway	S
Poland	I
Portugal	S
Romania	I
Russia	I
Slovakia	S
Slovenia	S
Spain	S
Sweden	S
Switzerland	I
UK	S

Source: ECMT (2005).

Pursuit of public versus private objectives

There are many situations in which governments would like to support specific aspects of the rail system in order to pursue public policy objectives. This may include reducing congestion and emissions of pollutants in other modes, providing access to remote and small communities, or fomenting economic development and trade. There is a fundamental challenge involved in identifying the social benefits and costs of freight services, and then funding them, particularly in the context of governments' pursuit of equal treatment among the modes, as well as in situations where rail is privately owned.

The task is especially difficult under vertical integration, when the only information available about costs for service and infrastructure provision is based on more or less arbitrary accounting separations and allocations. Institutional separations with transfer prices make it easier to identify the costs and benefits of the system's constituent parts. In Europe, increased vertical separation has made more transparent how financial support is given to the sector. Much of that support goes into

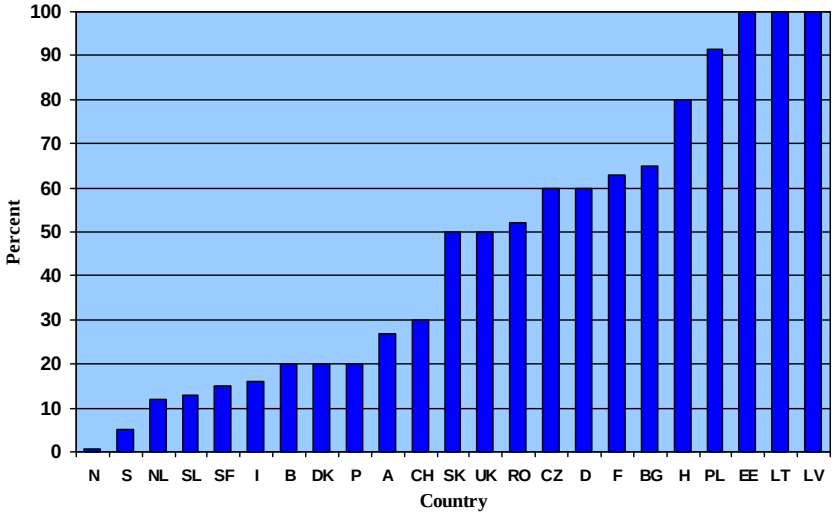
infrastructure provision where density economies may make it difficult for commercial operations to break even.

There are large discrepancies in the extent to which the costs of infrastructure are covered by charging. ECMT (2005) notes that some countries charge at levels significantly below the rational lower bound represented by marginal costs, including renewals (see Figure 2.4). In other systems, freight effectively subsidises passenger service. In some instances, differences in the way charges are structured along international corridors can create barriers to international services. These examples are unique to cases of vertical separation; where services and infrastructure are integrated in a single, commercially viable entity, it must be assumed the former are covering the costs of the latter.

EU Community law permits support of infrastructure and of social services (primarily suburban or regional passenger traffic), but restricts support to activities that are "commercial", such as freight or intercity passenger services. The European Commission has recently put forward a EUR 200 billion plan for upgrading rail lines under the Trans-European Networks (TENS) programme.

In North America, the private and commercial orientation of the system makes it difficult for government to intervene, other than by way of regulation. Deregulation in the US and Canada since the early 1980s has greatly reinforced the commercial orientation of the system, for example leading both to consolidation of the industry and to branch line abandonment, practices that had previously been virtually forbidden.

Figure 2.4. **Percentage of total cost covered by infrastructure charges in European countries, 2004**



Source: ECMT (2005).

Note: "Cost recovery" refers to revenues from charges as a proportion of total expenditures on the network on operations, maintenance, renewals, interest and depreciation. Marginal costs can be expected to lie at roughly 15% to 20% of the cost figures reported. Countries included are Norway (N), Sweden (S), Netherlands (NL), Slovenia (SL), Finland (SF), Ireland (I), Belgium (B), Denmark (DK), Portugal (P), Austria (A), Switzerland (CH), Slovakia (SK), United Kingdom (UK), Romania (RO), Czech Republic (CZ), Germany (D), France (F), Bulgaria (BG), Hungary (H), Poland (PL), Estonia (EE), Lithuania (LT), and Latvia (LV).

One concern with this model is its limited flexibility to meet social and public policy goals. Thompson (2007) highlights an increasingly "unacceptable" level of congestion in US freight rail, which suggests that profitability is not sufficient to pay for new infrastructure. In some instances this

is leading to *ad hoc* solutions. For example, the Chicago Region Environmental and Transportation Efficiency (CREATE) programme involves co-ordination among public authorities (city, state and federal) and private rail companies to upgrade rail transport in that city. Financial contributions are provided based on recognition that there will be both public social benefits and commercial benefits to the private parties. Similarly, California's Alameda corridor involved contributions from both public parties and rail companies.

2.6.2. PPP models

PPP projects of the type seen in the road sector are less prevalent where rail infrastructure is concerned. This is perhaps due to the fact that rail is more likely managed on a network basis, and because railway operators are already typically at an arm's length from government decision-making in many countries, as a result of their organisational structures.

However, there is also a growing number of PPP projects in the rail sector. For the most part, these ventures provide a special service that it somehow differentiated from the rest of the network.

One example is the Channel Tunnel Rail Link (CTRL). CTRL was launched in 1993, as the largest project under the PFI, to connect London with the Channel Tunnel, and therefore speed up travel time to Paris on the Eurostar. The project was also an EU Trans-European Networks (TENs) project. Revenue forecasts proved to be highly optimistic, resulting in the British government having to backstop the concessionaire with a loan guarantee. On the basis of this guarantee, in 2006 the UK Office of National Statistics determined that the government had a controlling interest over the project's parent company, London & Continental Railways, which was thus reclassified as a "public non-financial corporation". This decision added an additional GBP 5 billion in debt to the government's balance sheet (Clark and Seager, 2006).

In a similar vein, the Eurotunnel Group, created in 1986 to build and operate the Channel Tunnel, has struggled with the initial debt incurred for the project, which cost six times more than initially projected. However, the Channel Tunnel was not a PPP *per se*, but rather a fully private endeavour with little risk sharing.

Sweden's Arlanda airport rail link is another example of a PPP in the rail sector. In return for paying for about 70% of the infrastructure investment, the concessionaire is entitled to charge train passengers both to pay for operating the train and in order to recover the initial investment, over a period of 45 years. The Arlanda contract assigns both market and cost risk to the concessionaire. The Swedish government provides a "guarantee loan" to the operator which is subordinate to all private debt; by postponing interest and debt retirement until private debt has been repaid, this results in a reduction of the company's costs for debt service during its first years of operation (see the Annex for more details).

Another rail-based PPP, established in 1999, is the Netherlands' High-Speed Line (HSL) rail link between Antwerp and Amsterdam, based on a 30-year concession. The concessionaire is remunerated by government on the basis of a performance agreement, which demands 99% in order for the private partner to receive its full payment, and there was no transfer of demand risk (KPMG, 2005).

The UK's PFI also includes an example of a PPP to provide, maintain, renew and upgrade elements of the London Underground metro system. This involves 3 separate 30-year contracts for different elements of the work, with payments based on performance, including bonuses for surpassing a given cap, and penalties for not meeting it. Complications regarding the use of the public sector comparator in this case are discussed in Chapter 5.

Australia has had several rail PPPs. These have included both rail service provision, and infrastructure development (Shmith, 2006). However, projects have sometimes not met with expectations, including lower than expected financial returns, sometimes requiring government intervention (Stott, 2004; Roberts, 2006).

These examples largely demonstrate the point made above, that rail PPPs are likely to focus on specific services or needs, as an adjunct to the larger networks, which are also managed using devolution models, typically state-run or private organisations.

2.7. Inland waterways

By and large, inland waterways have been publicly owned and managed in many countries. There are several reasons for this, including some of their "public good" aspects – as a source of fresh water, recreational public amenity, habitat protection and potential hydro-electric generation possibilities. For instance, Austria's special purpose vehicle Viadonnau, is responsible for maintenance of the Danube waterway, but it has a broad mandate beyond transport, including, for instance, flood control. Moreover, the organisation is subject to the Mannheim Treaty, prohibiting tolls on river traffic, so there is no immediate prospect for raising user fees for financing infrastructure.

One example of devolution in the provision of an inland waterway is found in Canada. The St. Lawrence Seaway Management Corporation, a not-for-profit organisation jointly owned by a group of local stakeholders, operates the Seaway on behalf of the Canadian government, under a 20-year agreement. Toll rates are set to pay for operating costs while the government contributes to necessary capital investments (Virtuosity Consulting, 2005).

Other recent new developments have also involved consideration of the use of PPPs. For example, France recently approved a public survey for a new 100-kilometre canal to connect the Seine basin with the north of the country, providing access to Belgian waterways. PPP options are being considered for this (ITJ Logistics Worldwide, 2006).

KEY CONCLUSIONS

- While it is impossible to provide an exact figure, there appear to be considerable future investment needs in the surface transport sector, which would not be met by current expenditure levels. As a result governments are seeking out "innovative" means of providing infrastructure. This has led to significant outsourcing and devolution in recent decades.

- Experiences vary vastly across different regions and countries, as well as in the different modes.

- Most roads, in terms of kilometres, continue to be provided directly by state ministries or agencies. However, there is significant contracting out of basic works services.

- There is also considerable devolution of the operation and maintenance of motorway networks to companies that are either fully or partially state-owned, or fully private. Furthermore, there is considerable use of PPPs to provide specific links, including stretches of motorway, bridges and tunnels. In general, devolution and PPPs do not account for most of any country's road network, but do focus on elements that are particularly high-profile, strategic, and move much traffic.

- In most countries, fuel taxation and other charges on road users provide a large chunk of revenue for the public sector's budget. Typically, this revenue is not earmarked for use within the sector. Direct user charging is used sporadically, although there is an increasing interest around the world, with a view to providing for funding needs and disciplining the use of road infrastructure.

- Where rail is concerned, devolution is the norm, be it through state-owned companies or full privatisation, although the latter is only applied where the carrier service and infrastructure operation are integrated. One country is experimenting with a private, not-for-dividend model.

- There is a great variation internationally regarding the extent to which infrastructure costs are covered by users.

- PPPs are rarer in rail than on roads, and again tend to focus on specific links that provide a specialised service.

PART II. PRINCIPLES FOR THE BUDGET TREATMENT OF SURFACE TRANSPORT INFRASTRUCTURE INVESTMENT

Given the large amounts of money involved, how surface transport infrastructure investment is dealt within government budgets has important potential implications for long-term economic stability. This section discusses principles that should be taken into account when considering this question.

3. INFRASTRUCTURE INVESTMENT AND BUDGET TREATMENT

3.1. Introduction

This chapter discusses the possible implications for the public sector's budget of the choice between different models for the provision of infrastructure. The focus is on whether a given initiative is considered on or off the public budget and whether this should have any real significance for the choice of model.

Transport officials have an understandable tendency to regard investment in their sphere of influence through a "transport lens", thus seeking the greatest possible sustainability of financial flows into their sector. However, the cabinet as a collective may not always see things in the same way. Other ministers will seek stability in financing for their portfolios, while the finance minister may wish to retain maximum future flexibility where the use of tax revenues is concerned to deal with unforeseen economic circumstances and changing policy priorities.

Of key importance for the cabinet-level decision-making process are the implications of different models for infrastructure provision where public sector budget balance is concerned, particularly given the enormous costs involved. The impact on the state budget can be in terms of limitations on the ability to spend on other priorities, or in terms of the debt incurred, with subsequent ramifications for overall macroeconomic stability and interest rates. Thus, not surprisingly, an essential consideration in the choice of whether and how to carry out land transport infrastructure initiatives is precisely how it will impact on public finances.

This chapter begins in Section 3.2 with a description of available alternatives for accounting for surface transport infrastructure investment in the public budget. Section 3.3 summarises some overall arguments for and against budget balance. Section 3.4 looks at instruments for disciplining budgets; a special review of the European Union's "Maastricht Criteria" is included. Section 3.5 raises some concerns with respect to political considerations and Section 3.6 concludes.

3.2. Accounting for infrastructure in the public budget

Both in the construction of new infrastructure and in maintaining existing assets, real resources are employed, meaning plant, staff, land and equipment. Considering the large amounts involved for new infrastructure, some type of borrowing may be necessary. Governments can choose between different ways to pay for these costs – *i.e.* "up front", using existing resources; public sector borrowing; or using an intermediary agent such as a private partner in a PPP arrangement. Each option has different budgetary consequences.

One way to handle both investment in new infrastructure facilities and ongoing maintenance is to consider all activities as if they were consumed during the year of the expenditure. An implication of this approach is that new investments depend on the availability of financing from the government's overall budget, sourced from annual taxes. Another consequence is that ongoing spending on future upgrading and maintenance of projects is not guaranteed, as it must be approved in future budgets. This makes it difficult to commit to a life-cycle approach to infrastructure spending. In this model, the overall investment is inherently consolidated with the state budget; in other words, the investment is *on-budget*.

An alternative is for government to borrow in order to pay for the investment. This means that the government pays back the loans over the life span of the project or some other period of time. In this way, it is feasible to spend more than is raised in tax and other revenue during a given year. Borrowing can be considered on budget since the state debt increases.

A third way to handle the investment cost is to place it *off budget*. The outsourcing and devolution models described in Chapter 1 may be used for this purpose. For example, a PPP arrangement may be established, whereby a private partner or special purpose vehicle assumes debt related to the project, and is compensated by the government and/or directly by users over the project's life cycle, thereby allowing it to amortise this debt. In this case, the government makes payments not directly to the original lender, but rather to an intermediary company that assumes the debt. The discussion of Austria's ASFINAG motorway operator in the Annex indicates that, under some circumstances, it is also feasible to place investment spending by government-owned enterprises outside the public budget.

The panels in Figure 3.1 illustrate how costs show up in the public sector budget in each of the models (see also Alfen Consult, 2006). A hypothetical situation is created in which an investment of 100 units of currency is required to construct a new asset. In addition, 5 units each year are required for maintenance after the initial investments. The project life-span is five years. All financing is assumed to come from the public budget, and not from direct user charging.

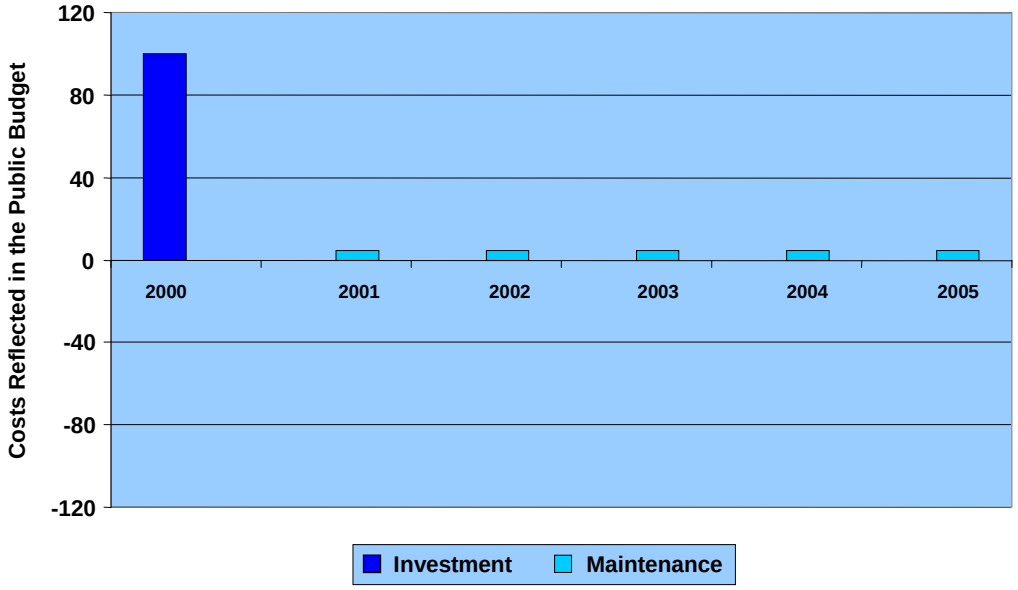
Figure 3.1.a shows the initial investment paid for by the government, after which it makes additional payments to maintain the asset. Figure 3.1.b shows the budget consequences of the government borrowing to pay for the infrastructure asset that is being built. Initially, it balances a debt of 100. In each year there is a set payment of the principal loan and a corresponding reduction of the debt, as well as payment for maintenance. There is also a payment of interest, which is assumed here to be 5%. These two approaches to on-budget accounting for costs can, of course, be combined with some investment costs being paid immediately and the remaining being activated via debt.

Figure 3.1.c illustrates the impact on public finances of the private sector taking up debt to undertake an initial investment. This debt is not made part of the public sector's budget. Rather, the public sector makes payments to the private partner to pay off this debt and resulting interest, which here is assumed to be 6%, noting that private lenders must often pay a higher interest rate than the government itself to raise debt. Payments are also made to cover maintenance costs. Thus, government payments to compensate the private partner over the life cycle of the project are only reflected in the budget it the year in which the payment occurs. However, these payments are the same, or (as in the example) even slightly higher, than they would be if the debt were on budget.

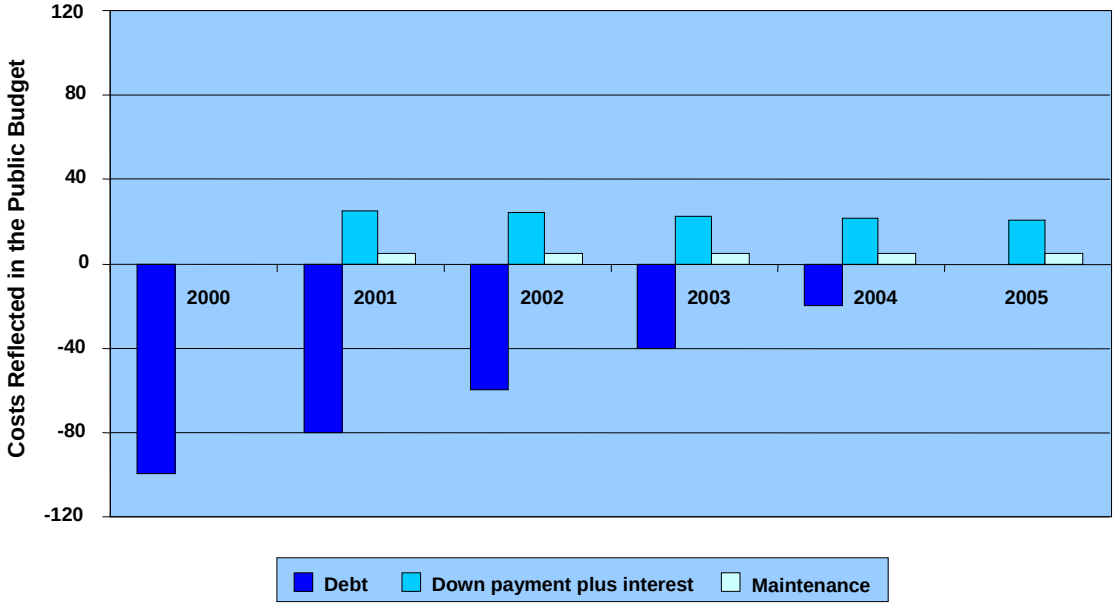
When borrowing, it can appear as if the government's scope for spending increases. This is, however, a purely transitional phenomenon, since, in the long run, there may be no budget difference between treating investments as current spending or as assets that are financed by loans. For example, a government may assume a need to spend 100 currency units per year overall on road building and maintenance, and finance this with a borrowing programme over several years. As a result, it may only need to spend 20 units in the first year to pay down principal on the first year's loan of 100 units. In the second year, it would have to pay 20 on the first year's loan, plus an additional 20 on the second year's loan. After five years of borrowing, the government will be paying 100 units per year to pay down the principal on its loans – the same amount that it would have been paying had it financed the needed infrastructure directly from the budget – as well as additional interest. This could become problematic if the government interprets the lower expenditure on roads in the first years as greater scope for making other investments, either in roads or elsewhere in the economy. As obvious as this sounds, such errors are not uncommon. One such example is provided in Box 3.1.

Figure 3.1. **Impact on the public budget of different means of financing infrastructure**

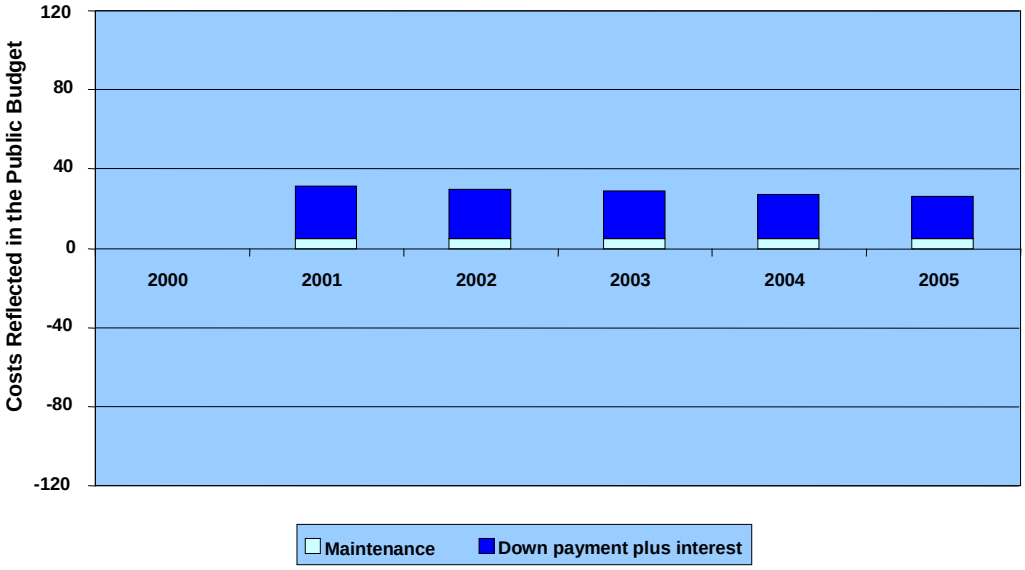
a. Traditional Financing from the Public Budget



b. On-Budget Investment Spending



c. Off-Budget Investment Spending



Box 3.1. PPP road financing in Portugal

The Portuguese PPP experience demonstrates the effectiveness of PPPs in rapidly developing infrastructure and in improving the quality of public services. It also strongly suggests the need to carefully consider the long-term budget implications of PPPs. These issues are considered here, based on Sousa Monteiro (2005) and KPMG (2005).

In 1997, the Portuguese government initiated a shadow-toll-based DBFO motorway initiative, referred to as the SCUT programme. While it resulted in the development of important roads with resulting benefits to society, the programme has also created new challenges for the public sector.

The central government's public investment budget amounts to more than EUR 6 billion. Forty percent of this is for transport projects, mainly railways, roads and ports. In recent years, the annual allocation for roads was less than EUR 700 million (about 0.5% of GDP). Expenditures financed from this budget included the maintenance of existing roads and bridges, the construction of new ones, and shadow toll payments to PPP concessionaires.

From 2007 on, a forecast indicated that the government's annual shadow toll payments would exceed EUR 700 million per year, over a period of 20 years. It was clear that this would put considerable pressure on the transport budget. Against this background, the government decided in 2004 to introduce real tolls in 3 of the 7 shadow-toll SCUT concessions, excluding roads in regions with lower per capita income and with inadequate alternative roads.

As a consequence of these experiences, Portugal has made a series of institutional changes. This includes a budget law which now defines several steps in the appraisal of PPP project proposals. A key feature is that the case in favour of PPPs – and the specific PPP model chosen – has to be made on the basis of a public sector comparator and with the involvement of experts from the Ministry of Finance. PPP proposals must furthermore specify long-term budgetary implications and, more importantly, adequate long-term budgetary appropriations must be made prior to launching a PPP programme.

The key message is that if current spending is substituted for a long-term commitment to service a loan or to make payments to a PPP company, it is essential to recognise the long-term budgetary consequences of the transition. Failure to do so results in "affordability risk"; inasmuch as the aggregate of all commitments – including that of the PPP – may eventually prove to be greater than the resources available, thereby "silting up" the budget and crowding out other investments. This risk may be larger when the life length of the assets is longer, as it may not become obvious as quickly. It may also be particularly acute if investments are made off budget, as the government will not receive external "signals" – such as a deterioration of credit rating, higher lending rates or surpassing pre-established deficit and debt limits – if borrowing appears unmanageable, meaning that there will not be an inherent disincentive to overspending.

It was presumably with this in mind that the UK's National Economic Development Committee concluded in 1981 that private sector involvement in public sector projects should not involve additional expenditure, but rather that public expenditures should be reduced to offset any private investment. In other words, private investment should be a substitute for, and not an adjunct to public investment. It also determined that any proposed private financing should be measured for efficiency against public provision of the same project. These rules – which are collectively referred to as the "Ryrie Rules" after the committee chair, Sir William Ryrie – are obviously intended to discipline governments' spending and ensure long-term affordability. Notably, these rules have been relaxed in recent years (Kain, 2002).

Seen through the "transport lens", there is much to be said for ensuring a steady flow of financing to transport assets, which can be accomplished by off-budget PPP construction. However, the public finance ramifications of this must be understood and accepted, which, once again, highlights the importance of ensuring "buy-in" from the entire cabinet, especially the finance minister.

The messages from this discussion can be summarised as follows:

- The choice between paying for investment directly or by taking up loans makes a difference for the public budget only during transition periods, *i.e.* when total spending goes up or down. In steady state, the ongoing budget costs will be identical.

- Placing investments off budget may increase budget costs compared with the government taking up the same loan itself.

- Off-budget loans are not registered in any public sector accounting. However, in reality, they represent the same liability as if the government had taken up the loans itself.

3.3. For and against budget balance

Governments continuously take decisions about how much resources they wish to spend on different activities and on how to pay for this spending. The overall logic of these decisions is that costs and revenues should balance; there must be resources available to pay for the activities that are undertaken.

There are several motives to deviate from the basic budget-balance principle, at least in the short term. One reason concerns investment spending. By spending much today, citizens will benefit from the services rendered by a new road or railway during a number of future years. During a year with much investment, more will be spent than is raised from tax revenue. Rather than paying for these projects by current spending, it may therefore be reasonable to borrow in order to let the future users or taxpayers pay back loans over the lifetime of the assets.

The "golden rule" of debt finance says that a public budget deficit is acceptable as long as the value of the resulting public asset increases at least commensurately and the public net asset value does not degrade. For example, one UK rule states that "… the Government will borrow only to invest" (HM Treasury). This effectively means that public debt is permitted for investments in infrastructure, human resources (*i.e.* education) and know-how (*e.g.* research and development). Obviously, it is difficult to strictly abide by such a rule if borrowing occurs at a general level, and not specifically linked to a given activity.

As indicated in Section 3.2, the budgetary implications of postponing payments will, however, not differ from paying for investments immediately when the total sum spent on investment remains relatively stable over time. At most, the difference between borrowing and paying for an investment immediately will therefore have repercussions on the budgetary situation during transition periods, *i.e.* when investment spending increases or is cut back.

A second motive for spending more than is raised in tax revenue during a given period is to use the budget as a tool for counter-cyclical policies. By borrowing today to initiate projects, idle resources may be put to productive use and unemployment reduced.

With a switch from investment expenditures under traditional procurement to long-term service payments under PPPs, governments have less scope for changing expenditure in response to the business cycle or unforeseen policy priorities. This is perhaps a particular concern in monetary union situations, such as the Euro-zone, where members have lost the option of using monetary and exchange rate policies to stabilise the economy, leaving fiscal policies as the only macroeconomic instrument to deal with cyclical fluctuations in aggregate demand. Substituting long-term service payments for investment expenditure may further reduce the scope for counter-cyclical fiscal policies. But whether this is a genuine drawback very much depends on one's belief in the effectiveness of discretionary fiscal policy in the first place – a question that remains controversial.

Even if there are motives in favour of spending more than is raised by revenues, this policy may in itself create problems. One is related to credit worthiness – a country with large debt relative to its productive capacity may run into problems with respect to the ability to service its annual costs. Lenders may require higher interest rates from such countries than from countries with smaller debt/production ratios. The higher interest rate can be seen as a market-based way to signal problems with respect to spending.

A further related concern is that profligate governments may endanger price stability. This is the case if a country spends heavily on infrastructure during an upward phase of the business cycle or if spending is funded by printing money. In addition, extensive public sector investment might crowd out or displace private investments.

For these and other reasons, many governments have imposed voluntary restrictions on their budget policies. These are addressed in the next section.

3.4. Disciplining public expenditure

Decisions regarding investment should be based on overall considerations of long-term macroeconomic stability, and instruments should be in place to impose this discipline, including rules regarding deficit spending.

The problem arises when these rules are unclear, or lead to perverse incentives. For instance, a public investment means that resources are spent in order to create an *asset*. If the investment is

financed with debt and if the budget does not include an active asset registry, only debt is recorded. One consequence is that information about the net assets or net debt of a country is not readily available.

There are several ways for governments to constrain their own decisions with respect to budget balances. These include rules such as qualified majorities to take budgetary decisions, sunset legislation and periodic reviews of all spending, *etc.* Rules relating to the participation of citizens in some decisions, federalism, *etc.*, may also help to control budget balances. Preposition 13 of the US state of California, for instance, requires a two-thirds majority to introduce new taxes.

Such restrictions can have important implications for the accumulation of public sector debt and for economic performance. Studies carried out by the US federal government indicate that American states with stringent budget rules pay lower interest margins on debt than those with weak budget rules. Strong budget rules and long-term stability will likely be reflected in the interest charges paid on state debt (Bohn and Inman, 1993). Other factors include inter-temporal budget constraints, meaning that public spending must not exceed tax income in the long run.

There are also rules of the same nature to establish whether PPP projects should be reported on or off the budget. Their rationale lies in making clear statements regarding the status of a nation's aggregate debt, and thereby the underlying commitment of that country to making payments on the debt.

In the US, the Congressional Budget Office has established six points as criteria for recognising PPP projects as not part of the public sector (US Congressional Budget Office, 2003), as follows:

- The fixed asset serves a general purpose (not further specified by the government).
- The fixed asset also has a market in the private sector.
- During the term of the contract, the private partner has ownership title to the asset, which is not subsequently transferred to the government.
- The contract does not stipulate a bargain-price purchase option.
- The contractual term does not exceed 75% of the estimated economic life of the asset.
- The present value of the minimum rent payable during the contractual term may not exceed 90% of the fair market value at the beginning of the contractual term.

A common currency area is particularly vulnerable to single states that do not balance their budgets. The reason is that a single state may benefit from overspending, without necessarily jeopardising the currency and the federation's credit worthiness. It can then overspend in the short run without having to pay the price for doing so, *i.e.* a higher interest rate. But this incentive is obviously present for all member states, and if all acted in a similar way there would be no chance of avoiding the negative consequences for price stability, credit worthiness, *etc.*

- Most common currency areas therefore have rules and regulations with respect to single states' budgetary situations. This concerns both the size of the budget deficit during a single year and the size of the aggregate debt. In Europe, the European Commission registers member states' detailed public sector data by way of the Statistical Office of the European Community (Eurostat). There is a set of common regulations, definitions, classifications and

accounting standards that detail the way in which spending and tax collection should be accounted for, described in Section 3.4.1, below.

3.4.1. Budget treatment rules in the European Union

The convergence criteria for the European Monetary Union – the "Maastricht Criteria" – are defined in terms of national account data. The European member states are subject to, *inter alia*, the following rules for public budgets:

- The overall public debt shall remain under 60% of GDP.
- The annual new deficit shall remain under 3% of GDP.
- Member states shall achieve a mid-term balanced budget.

These rules obviously have implications where new investments are concerned, because placing investment debt off budget would make it easier to meet these criteria. This is the background for Eurostat's rules regarding this issue.

Public investment in infrastructure projects is accounted for in the "General Government" section of the public accounts, and, where borrowing is involved, results in increased government deficit and debt, meaning that the project is *on-budget* (EC, 1996). However, investment made by a publicly owned corporation can be considered *off-budget* as long as at least 50% of costs are covered by revenues.

In 2004, Eurostat defined how PPPs should be treated in national accounting (Eurostat, 2004). The paper discusses how contracts signed by government units in the framework of partnerships with non-government units should be dealt with. In this, Eurostat emphasized that it did not examine the motives, rationale and efficiency of these partnerships, but rather sought to provide guidance on their treatment in national accounts.

The core of the document established that assets controlled by a PPP body can be considered to be off the public books only if there is strong evidence that the partner is bearing most of the risk attached to the specific partnership. In particular, Eurostat recommends that the assets involved in a PPP should be classified as non-government assets if both of the following conditions are met:

1. The private partner bears the *construction* risk.
2. The private partner bears at least one of either *availability* or *demand* risk.

Our discussion of risk in Chapter 6 indicates that risk transfer, in reality, is complex, in the sense that not all of a given type of risk can easily (or should be) transferred. This is perhaps particularly the case where demand risk is concerned, inasmuch as this type of risk is especially complex for the private sector to manage, and is thus not usually fully transferred.

The consequences of Eurostat's criteria can be examined in the context of the actual models for the provision of road infrastructure that are common in Europe, which involve tolls and shadow tolls, as well as state-owned companies (Alfen and Leupold, 2006a).

In these models, construction and availability risk are typically borne by the private partner. Furthermore, in user-financed concessions projects, such as the German A and F-Models (see the

Annex for a description), and within a shadow toll scheme, the private partner also has to bear the demand risk. It thus, *a priori*, seems clear that these PPP models should be considered as off-budget according to the Eurostat criteria.

However, the distinct nature of each project and its risks means that it is not easy to make blanket generalisations regarding the degree of risk transfer in different types of arrangements. The final evaluation of the on or off-budget classification of a project must result from a review of all contractual regulations that affect the allocation of risk.

One aspect is that the degree of risk transmission is not only determined by the project's payment structure. The means of paying the PPP contractor only gives a first indication of the degree of the intended transmission of demand risk. Furthermore, some construction risks may be shared with the principal (*e.g.* soil condition risks), meaning that the complete transfer of construction risks is questionable.

Box 3.2. Eurostat criteria applied to motorway financing in Hungary

Hungary provides an example whereby Eurostat's rules regarding budget treatment limited the extent to which a given model could be considered "off-budget".

With a view to meeting motorway infrastructure needs as well as the Maastricht budget criteria, in 2004, the Hungarian government sought to transfer existing motorway contracts, as well as responsibility for future construction, to ÁAK, a government-owned company. The idea was that the government would then pay an availability fee for the routes. It was intended that ÁAK's debt not be consolidated with Hungary's overall debt, on the assumption that more than half of its earnings would come from user charging. However, in September 2005, Eurostat determined that the transfer of existing and half-finished roads could not be considered to be off-budget.

The value of the routes in question represented 1.5% of Hungary's GDP, meaning that the country's 2005 deficit moved from 3.6% to 5.1% of the GDP. In addition, as the half-finished roads were thus not transferred, the government needed to continue financing these, resulting in additional payments of HUF 125 billion (close to EUR 500 million) in that year.

It could be argued that Eurostat's ruling saved Hungary from greater future financial woes, inasmuch as it prevented the creation of a model that would not have been sustainable, although there is no counterfactual to prove this. Notably, however, the Hungarian Central Bank opposed the off-budget strategy from the beginning.

The efforts to create this model, and to reform it after Eurostat's ruling, engendered important transactions costs. In addition, as the government did not provide loan guarantees to ÁAK in order to meet Eurostat criteria, the company pays higher interest rates on its debt. In other words, there was a cost involved in pursuing a given model primarily because it could potentially be considered off-budget.

Another example, with bearing on the concession model, is that the public partner sometimes commits to providing a subsidy if traffic is less than expected. This means that the extent to which demand risk is borne by the public or private partner depends on the threshold of the subsidy. If the threshold is very low – meaning that traffic volume must be relatively much lower (*e.g.* 50%) than expected in order to qualify for a subsidy – most demand risk is transferred to the private partner. However, if the threshold is high (*e.g.* 80% of the traffic volume), the demand risk is basically borne

by the public entity. Within a shadow toll model, the classification of on or off-budget depends on the applied banding structure, whereby traffic levels dictate the shadow tolls paid, and, in any event, the transfer of the demand risk may only be limited (see examples of traffic bands in Chapter 6).

If a model with real tolling is applied, some risk can sometimes be transferred back to the public sector, for instance through minimum guarantees or compensation payments if traffic deviates from what has been forecast. This also brings into question the extent to which the model can be classified as a private investment.

The International Monetary Fund (IMF) (2004) has been critical of Eurostat's approach, noting that most PPPs involve transferring availability and construction risk to the private partner, meaning that they would be considered off-budget, although government would retain demand risk. The IMF thus suggests that the Eurostat criteria open the door for the selection of PPP models primarily as a means for circumventing fiscal constraints.

Eurostat's off-budget status can also be accorded to state-owned companies. In the Austrian case, for example, the fact that more that 50% of ASFINAG's production costs are recovered from user charges was a key factor in its categorisation as being off-budget (see the Annex). A more extensive example of the application of the Eurostat rules is provided in Box 3.2.

3.5 The politics of off-budget financing

By asking a private or other commercially oriented entity to borrow money to have infrastructure built, there is a possibility that the spending will not be accounted for as part of the public sector's commitment. This has, in reality, been a very important motive for many countries to pursue PPP projects.

For example, seven of the first eight motorway projects under the UK's PFI initiative were initially intended to be considered as being off the Highway Agency's books. However, further examination led to a change in accounting policy, with the result that all of these were reintegrated with the agency's budget. The agency subsequently declared that it would look to ensure that sufficient risk was transferred in future projects to allow for projects to be off-budget, while also recognising that accounting treatment should not be an aim in itself (Edwards *et al*., 2004). Chapter 2 also discussed the Channel Tunnel Rail Link, which began as a PFI project but was later determined to be under government control, adding a significant amount to the public debt.

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It has, however, already been established that the absence of an official entry of debt in the public accounts has no real significance for the economic situation of that country. In one case, the country registers debt, meaning that it owes money to some lender(s). In the alternative case, there is no direct loan taken up by the government, although it has still committed to paying an annual amount that corresponds to the down-payment of a loan. Even if there is a legal difference between the two procedures, they do not differ in substance.

We therefore return to the basic assumption of this report, namely that the primary justification for using any model of providing and financing infrastructure is whether or not it adds to aggregate efficiency. Once again, the budget treatment of a given model for financing infrastructure has no inherent relationship to the social benefits and overall costs of that model. Thus, the fact that a model is off budget is not, itself, an economic argument for employing it (Vining and Boardman, 2006).

However, the use of models that do not reflect debt on the balance sheet could be a means of avoiding the negative short-term political consequences of overspending. The full financial ramifications of off-budget investment in infrastructure are likely experienced over a long period of time – much longer than any decision-maker's term in office (Demetriades, 2006). Where a PPP defers payments to future users or taxpayers, today's politicians could potentially use these mechanisms to reap the benefits of building new infrastructure, without facing the consequences.

In other words, it is understandable – but not necessarily acceptable – that models may be chosen based on political considerations regarding the extent to which investments in infrastructure are consolidated with a government's balance sheet, rather than based on strictly economic considerations. The potential impacts of such decisions where surface transport infrastructure are concerned are very large, given the amounts of money involved. Decisions taken today on the strength of inappropriate incentives have the potential of leaving future taxpayers and users with a legacy of debt, and little benefits to show for it.

The accounting rules related to budget treatment are thus clearly of great importance. The fact that such rules allow some models to be treated as off-budget may thus result in decision-makers choosing these because of their budgetary implications, as opposed to their efficiency implications. In other words, the accounting rules may result in perverse incentives that ultimately are not to society's benefit, and should thus be carefully designed to be as neutral as possible with regard to the procurement method.

3.6. Summary

Budget rules for public finances are not set up for nothing. Rather, they are intended to serve the stability of the economic area and to ensure fairness between generations, in terms of investments made and financial commitments undertaken. While the allocation of projects to private investors can provide a short-term opportunity for the realisation of infrastructure projects, the actual intention of the target system has to be kept in mind.

There is no inherent link between budget treatment and efficiency where transport infrastructure investment is concerned. Models for the provision of infrastructure should be carefully designed with a view to maximising the latter, and without reference to the former. However, this is often not the case.

Even if the economic rationale for placing spending off budget is weak, there may be other motives for doing so; for example, a PPP contract design chosen because of its efficiency-enhancing potential may also result in debt being placed off budget. From a practical perspective, this requires clear guidelines for how this aspect should be handled in the decision-making processes related to infrastructure financing. If not, a good idea (such as PPP contracting, in some cases) may not achieve its potential because of mishandling of the budgetary questions addressed in this chapter. The off-budget mechanism will only bear fruit if overall spending is carefully balanced to take into account available resources in the long term, as well as other priorities. It is thus essential that any investment in infrastructure be conducted based on a full understanding of the implications for future government spending.

KEY CONCLUSIONS

- Infrastructure investment should take place employing an all-of-government approach that considers the availability of public resources in the longer term.
- Additional resources for public infrastructure investment cannot be created by the manipulation of public accounting rules.
- The primary consideration in choosing a given model should not be the extent to which it is on or off-budget.
- Accounting rules regarding budget treatment should be carefully designed so to be as neutral as possible with regard to the procurement methods employed.
- Decision-making processes regarding the creation of models for providing and financing infrastructure should include means of verifying that the motives for employing a given model are rooted in the increase of efficiency.

PART III. PURSUING EFFICIENCY GAINS IN THE PROVISION OF SURFACE TRANSPORT INFRASTRUCTURE

It has already been established that efficiency gains should be the primary motive for choosing one model for the provision of surface transport infrastructure over others. This part considers the potential for augmenting efficiency in the different models described in Chapter 1, as well as their limitations. It begins in Chapter 4 with a discussion of the overall concept of efficiency, and the elements that comprise it. This provides the framework for the consideration in Chapter 5 of the theoretical arguments regarding how the various models can increase efficiency, as well as the potential and observed disadvantages of each. Chapter 6 looks at the fundamental issue of the sharing of risk between public and private partners where PPPs are concerned. Finally, Chapter 7 looks at a key determinant of efficiency in the provision of infrastructure that is not dependent on the organisational model employed, namely the extent of user charging versus subsidisation.

4. PRINCIPLES FOR EFFICIENCY IN THE PROVISION OF SURFACE TRANSPORT INFRASTRUCTURE

4.1. Introduction – What is efficiency?

It has already been emphasized that efficiency should be the primary justification for choosing any particular investment of society's resources over another. This chapter provides a working definition of this fundamental concept, and describes the factors that contribute to it.

For the purpose of this report, *efficiency* is taken to mean some combination of *reduced costs* and/or *increased benefits* to society (Virtuosity Consulting, 2005). More specifically, this translates into any of the following:

1. Reducing inputs (i.e. money, people, assets) for the same outputs.

2. Obtaining more outputs or improved quality for the same inputs.

3. Obtaining proportionally more outputs or improved quality in return for an increase in resources (ODPM, 2005).

However, if input prices – *i.e.* the rate of return paid on capital or the labour costs – are reduced without affecting output, this does *not* improve efficiency from a social point of view. The reason is that the lower price of, for instance, labour (*i.e.* a lower wage) is beneficial for one party (the employer) and negative for another (the employee) and these two effects cancel each other out.

The efficiency concept has different dimensions and, for each, it is feasible to define more or less precise tests to assess whether or not an organisational model meets the respective efficiency targets.

The first dimension involves ensuring that "the right things are being done" so that society's resources are directed to the uses that provide the maximum level of welfare. This is referred to as *allocative efficiency* and is further discussed in Section 4.2. The second main concept is referred to as *productive efficiency*, and concerns cost minimisation – *i.e.* carrying out activities at the lowest possible cost. This is addressed in Section 4.3.

4.2. Allocative efficiency

Allocative efficiency comprises two dimensions: First, it must be ensured that new infrastructure is added when, and only when, necessary. Secondly, it is important to make sure that existing infrastructure is efficiently used; to this end, prices for using this infrastructure should be appropriately set.

4.2.1. Investment

Spending on new or upgrading the standard of existing roads or railways will be efficiency-enhancing if infrastructure investment – building a new bridge, for instance – reduces society's costs for travel and transport, compared with not making the investment. A project may also

enhance the benefits of the existing transport system, such as by opening up new ways to travel and transport or improving the quality of the system. If the cost savings and benefits of a project, taken over its lifetime and net of maintenance and operating costs, exceed the costs for having it built, then the project will add to the welfare of a society. This is often referred to as the project having a positive *net present value* (NPV), a concept described in Box 4.1.

Allocative efficiency therefore requires that all investments should have a positive NPV in order to be built. The obvious corollary is that projects that cost more than the benefits that they add should *not* be built.

Organisational models that make it reasonably certain that projects with positive NPV are built, and that projects with negative NPV are not, will therefore add to allocative efficiency. This also means that the dynamic efficiency of society improves, as money today is motivated by future increases in benefits and/or reductions in costs. Society will, over time, be successively more well-off if such assets are constructed.

There are well-developed methods for calculating the net present value of infrastructure investments using social *Cost-Benefit Analysis (CBA)* techniques. A project sponsored by the EU has reviewed the state of the art of applications of CBA within the transport sector, and has come up with suggestions for calculation principles and parameter values, such as value-of-time savings, accident reduction, improved environment, *etc.* (HEATCO, 2006).

To be able to calculate NPV, the potential project must be appropriately described and designed. The project's *a priori* design specification may be decisive for whether its NPV is positive or not. There are two design features that warrant particular attention:

1. *Technical design:* Assuming that a current road, railway or waterway between two cities is of inferior quality, it must be decided how this deficiency will be rectified. Should an existing road be upgraded to motorway standard, or is it sufficient to just add a new lane? Should a railway line be straightened or should an additional track be added in order to facilitate train meetings? Should a new type of lock be built in a canal or should the old one be renovated? Each choice of technical design should, in principle, be subject to economic analysis in order to identify which solution provides the highest NPV.

2. *Pricing or not:* Given that new infrastructure is to be built, should it be paid for by user charges or by tax revenue? To answer this question it is necessary to analyse the project's NPV with and without user charges, noting also the principles discussed in Chapter 7. The no-charges case must, however, also comprise due attention to the social costs related to "standard" (tax) financing; even if a user charge does not reduce the NPV of a project it may induce lower social costs than the distortions caused by taxation.

The overall recommendation is therefore that projects with positive NPV should be built, as they provide more benefits in return for the costs initially spent. Of course, this is subject to the limits of available resources. For each project chosen, the design that results in the highest NPV should be selected. This is true with the exception of the pricing aspect, since a toll may reduce NPV compared to a no-toll solution, but may still be better than funding by way of taxation.

Particularly where PPPs are concerned, much emphasis is placed on *ex ante* value for money (VFM) estimations. One tool that is regularly employed is the "public sector comparator" (PSC), which compares the costs and benefits of a non-traditional model for infrastructure provision

(*e.g.* PPPs) with those of employing traditional methods (*i.e.* direct government provision of infrastructure). This is discussed in greater detail in Section 5.4.

Box 4.1. Definition of net present value

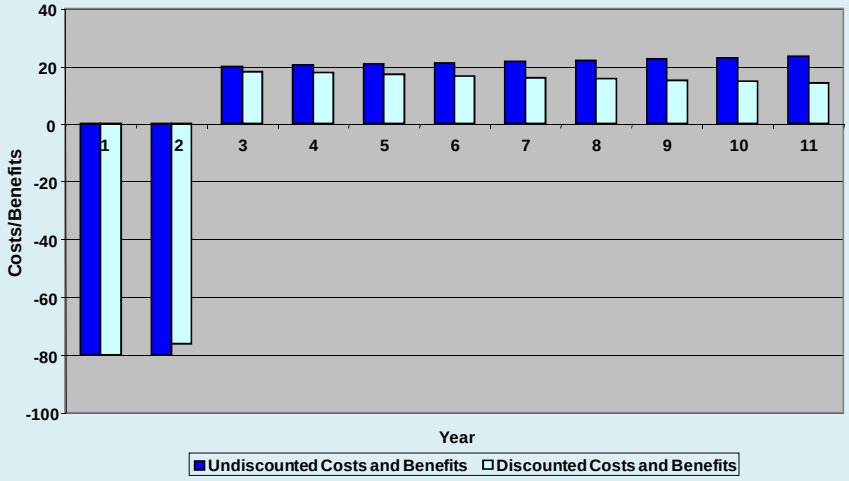
Assume that the costs for undertaking a project are 160 – 80 in year 1 and 80 in year 2. After having been built, the project will generate benefits of 20 in year 3. The benefits grow by 2% per year after that, until the investment must be scrapped after year 11, i.e. after 9 years of use. Adding these costs and benefits provides a net value of almost 35.

But costs and benefits in the future are worth less than costs and benefits "today". One technical method of incorporating this consideration into cost-benefit analysis is to discount future costs and benefits with a discount factor, in this way reducing their value. The below equation expresses the Net Present Value (NPV) of future benefits (B) and Costs (C), for all years (i) of a project, from its first (i=1) to its last (n=11 in the above example). The expression $(1+r)^i$ is the discount factor. If the discount rate (r) is 5%, the costs or benefits in year 2 will be divided by 1.05, and in year 6 by 1.28 ($=1.05^5$).

$$NPV = \sum_{i=0}^{n} \frac{(B_i - C_i)}{(1+r)^i}$$

Discounting benefits and costs in this way means that the Net Present Value of the above example project is close to -11. This means that the project generates fewer benefits than it costs to construct and should not be built. This is a different result than if no discounting is applied and can be explained by the fact that early costs are not reduced as much as are future benefits. Figure 4.1 demonstrates the way in which undiscounted and discounted benefits and costs develop over time.

Figure 4.1. **Hypothetical Demonstration of Undiscounted and Discounted Costs and Benefits**



The NPV is of course strongly affected by the parameter values. If, for instance, the discount rate were 3% and the value growth 5% per year, NPV would be 26 and the project would be worthwhile to undertake. A first year benefit of 25 rather than 20, which grows at 2% per year and with a discount rate of 5% would also generate a NPV of close to 26.

4.2.2. Pricing

A key issue with regard to the extent to which an infrastructure investment will produce more benefits to society than another use of the same resources is how the resulting asset is used. This is particularly important given that the use of that infrastructure can produce significant costs to society – in terms of environmental degradation and traffic crashes, for example – as well as benefits.

One potent means for affecting efficiency in resource use is the price, since the price charged affects the extent to which an asset is used. In particular, economic theory tells us that efficiency is maximised when users are charged the marginal costs generated by their use of the infrastructure.

This issue is dealt with extensively in Chapter 7. Furthermore, as noted in Chapter 1, for the most part, there is no intrinsic link between the various models for providing infrastructure, on the one hand, and specific pricing mechanisms, on the other.

4.3. Productive efficiency

Once it is decided that an initiative is to be carried out, this should be done in the cheapest possible way. For an investment project, this means that methods should be selected that provide for cost minimisation. The combination of equipment, material inputs and labour should be chosen such that no more resources than necessary are employed in the process.

A primary argument often put forward for the delegation of responsibilities for infrastructure to the private sector is that private companies are capable of greater efficiencies than the public sector. This argument is further discussed in Section 4.3.1. Section 4.3.2 then addresses the issue of costs of construction and maintenance from the life-cycle cost perspective. Section 4.3.3 discusses the importance of not jeopardising quality in the pursuit of low costs. Finally, Section 4.3.4 emphasizes public tendering as the ultimate tool for achieving the lowest possible costs.

4.3.1. Is the private sector more efficient? The principal-agent problem

There are a number of common assumptions regarding why the private sector may be more efficient in carrying out a given project than the government. The European Union's *Guidelines for Successful Public-Private Partnerships* (EC, 2003a), for instance, note the following outcomes as indications of successful PPP projects:

- Acceleration of infrastructure provision.
- Reduced whole-life costs.
- Better risk allocation.
- Better incentives to perform.
- Improved quality of service.
- Generation of additional revenues (e.g. more commercial development, leveraging of private funds).
- Enhanced public management.

Similarly, PricewaterhouseCoopers (2001) put forward the following objectives for projects under the UK's Private Finance Initiative (PFI):

- Construction on-plan, on-time and on-budget.
- Better quality of design and construction relative to traditional procurement.
- Whole-life-cycle approaches to deliver value and reducing costs.
- Early delivery of quality infrastructure providing wider social benefits.

There are various reasons why private sector entities may be more apt to maximise the various types of efficiency. The following list provides some examples:

- The private sector is usually more experienced in optimising the use of assets and their revenues (Freehills, 2002).
- The focus on profit maximisation and shareholder value results in better financial discipline and accountability than would be found in government (Arndt, 1999).
- Innovative design, and better construction methods and materials may be combined with efficient operation, adequate maintenance and low life-cycle costs (Harris, 2004).
- Private entities may benefit from more flexible labour management practices than public ones.

As relevant as these arguments may be, they do not offer a comprehensive and convincing logic for the private sector's supremacy. In contrast, the principal-agent paradigm offers such an argument. This theory is based on a two-step line of reasoning:

1. Any production process is plagued by incentive problems between one party that decides what should be done – the principal – and another party that actually does the job – the agent.
2. There is reason to believe that it is easier to overcome these agency problems when contracting with a private firm than within the public sector.

Two features constitute the core of the principal-agent problem:

A. *Information:* One party to a deal to provide a service, such as building new infrastructure, is typically better informed than the other. The agent sits closer to the activities that are to be undertaken and knows more about the details of the job than the principal; this is indeed a chief reason for employing an agent.

B. *Different goals:* The overall objective of the government is to maximise social welfare. In contrast, a commercial agent is focussed on maximising profits. These two goals may conflict with each other.

It is the combination of information asymmetries and divergent objectives that places the agency problem at the core of current microeconomic research. The fundamental challenge in creating an effective governance framework for any model for infrastructure provision is to ensure that the agent

(the infrastructure provider) will perform in the interest of the principal (the entity requiring the infrastructure).

It is important to acknowledge that the agency problem exists in any model for providing infrastructure, including all of those described in Chapter 1, and that there may be various levels of principal-agent relationships. For example, where public entities are responsible for delivering infrastructure, ultimately, the general public is the principal, entrusting important choices to elected representatives. Legislators, and particularly ministers are, in turn, in a sort of principal-agent relationship with the country's bureaucracy. Within the government, the principal role may be played by central ministries responsible for overall decision-making, such as the finance ministry, with the agent role being played by the ministry responsible for infrastructure delivery. Alternatively, the agency role may be delegated to a government agency, with the principal role being played by a ministry that oversees its activities, such as the transport ministry.

Where responsibilities for providing infrastructure are outsourced or devolved, the independent entity responsible for providing infrastructure (or elements of that task) will play the agent role, while the government, usually represented by a particular ministry, is the principal, acting on behalf of the taxpayer. In such instances, the agent could be the state-owned enterprise, private infrastructure provider, special purpose vehicle, *etc.*, while the principal would be the public sector, represented by some specific ministry.

Within organisations, the agency problem takes the form of divisions between governing bodies and management. For example, within a ministry, the minister takes on the role of principal, representing the elected government, while public servants will be closer to the actual delivery of services and thus play the role of agents. In the private sector, these roles are divided between the shareholders, represented by the board of directors, and the firm's management.

There are several possible reasons for assuming that the agency problem is better managed when employing private entities. To a large extent, these revolve around the clarity of purpose afforded to organisations that have limited and uncomplicated mandates, focused on tangible and measurable outputs.

The public sector is by nature driven by objectives that are relatively abstract, largely defined by the pursuit of the common, public good, meaning that it is more difficult to measure performance. It also has an enormous "clientele" to please, composed of citizens, communities, states, regions, businesses, special-interest groups, *etc.*, many of whom will have conflicting demands. In contrast, a private firm is typically managed to maximise profits, which can be relatively easier to measure. Moreover, it often has only a few owners, or at least fewer than in the public sector.

The public sector principal tends to be more heterogeneous, simultaneously involving central ministries (*i.e.* the finance ministry), ministers with diverging mandates, cabinet, parliament, the head of the government and, ultimately, the voting public. This means that the agent must try to appease the concerns of all of these, while also trying to meet users' needs. In contrast, a private firm usually has few owners and a (relatively) homogenous management board.

A public sector agent is also more likely to face "soft" budget constraints. Since it is not driven by a profit motive or the threat of bankruptcy, it may be easier for the public sector to make extra money available after budget overruns. In other words, public organisations are less likely to feel the consequences of inefficiency, as these are typically absorbed by the taxpayer (Kain, 2002). An official who knows this may be less prone to take painful decisions to cut costs, than if the budget constraint is absolute. Budget discipline may, in this respect, be stricter in the private sector organisation.

Taken together, these reasons explain why it may be easier to induce a private agent to reduce costs. This also explains many of the assumed benefits of using private service providers, which were outlined at the beginning of this section.

However, it is also useful to repeat that the public and private sectors pursue different objectives. These are the source of potential conflicts, which can be exacerbated by the agency problem. Kain (2002) notes that poor productivity on the agent's part may be very difficult and/or costly to substantiate, which naturally leads to the temptation to pursue profits at the expense of the principal. This, in turn, is a basic justification for the PPP model – by assuming risk, the private partner (agent) also takes on the financial consequences of its own productivity in carrying out the work. For this to be effective, strong competition in the tendering process is required, resulting in bids that are as close as possible to production costs. Furthermore, the contract regulating what the agent should do must build in provisions to prevent reducing costs by sacrificing quality and wider social objectives.

Furthermore, some of the constraints of public sector management may be overcome by devolving responsibilities for developing and managing infrastructure to entities that are – while not fully private in terms of their ownership – more strictly focused on the task of infrastructure provision, and independent to varying degrees in their decision-making; these organisations thus take on the role of agent, vis-à-vis the public principal. This option is covered in the next chapter.

It is therefore the manner in which an agent and, in particular, the private sector is involved that will determine the extent to which its inherent profit motive results in overall efficiency gains. The relationship between principal and agent is typically codified in a contract, so the key task is to design this contract in a way that makes it reasonable to believe that costs for doing the job will be minimised.

Two features of this contract will be detailed in the next sections, namely the life-cycle nature of the agreement and the need to safeguard quality. Contracting issues are also addressed in Chapter 6, dealing with risk, and Chapter 9, dealing with the importance of appropriate procurement mechanisms.

4.3.2. Cost efficiency and life-cycle budgeting

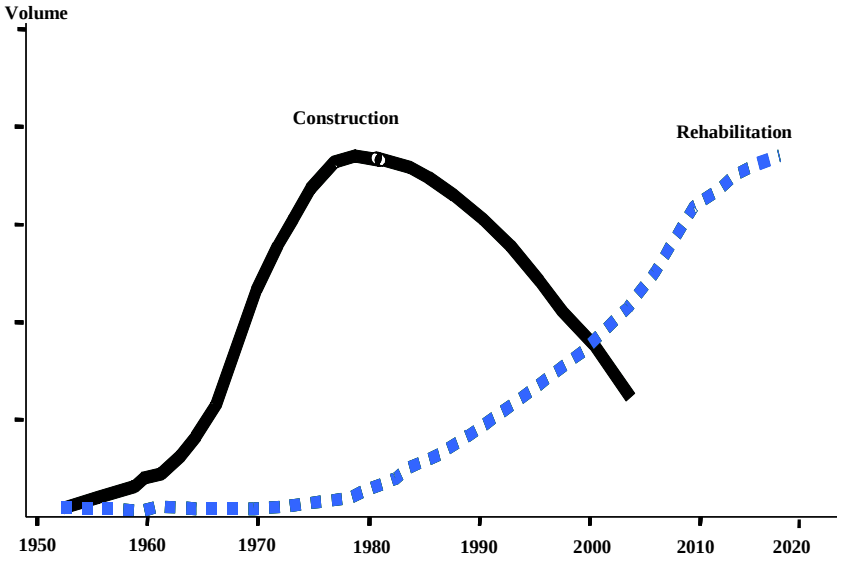
The aggregate maintenance and construction needs of transport infrastructure are characterised by cycles spanning decades. Obviously, the construction of new assets will generate future maintenance needs. The need for future maintenance funding can therefore be planned and justified on the basis of asset management systems, by making *ex ante* estimates of the wear and tear of fixed assets. The relationship between construction and maintenance is shown graphically in Figure 4.2.

It has already been noted that government budgeting processes may disconnect investment in new infrastructure and the subsequent needs for maintenance spending. Construction may, for instance, be more politically expedient than maintenance, in that the provision of new infrastructure may be rewarded with votes from those who benefit from the assets, or may result from promises made during elections. The political payoffs from decent maintenance standards are far less, and thus investments that build capacity are also often prioritised over those that maintain it.

This can be particularly problematic given that the current development of new infrastructure, benefiting the present government, creates a need for maintenance that places financial burdens on future governments. Furthermore, insufficient maintenance in the short term translates into more expensive maintenance in the longer term and increases the need for funding in the coming years that – again – will have to be paid by future governments.

Alternative models for the provision of infrastructure may to some degree alleviate this problem. With a "single entity" approach to designing, constructing, operating and maintaining an asset (Freehills, 2002), and an independent agent that is made responsible for all aspects of an asset, the contract can be signed on the basis of a long period, safeguarding future maintenance volumes. Provided that the contract is appropriately designed, the independent infrastructure provider is rewarded into taking decisions that create better results in the long run. In particular, it would balance the costs for different construction methods against costs for future maintenance in order to establish the appropriate initial design that will result in the lowest overall costs (EC, 2003a). It should, at the same time, be acknowledged that such long contracts will reduce the possibility for future governments to rebalance spending away from maintenance.

Figure 4.2. **The cyclical nature of transport infrastructure construction and rehabilitation**



Such an arrangement could involve creating a package of services covering the construction, capital funding, maintenance and operations (or some combination of these) over an extensive period. More spending during the investment phase may save on future maintenance costs. Alternatively, cheaper investments and more expensive maintenance may, in present value terms, be the preferred option. A cost-efficient project design is therefore one that delivers *the lowest life-cycle costs*.

Irrespective of which solution is chosen by the entrepreneur, life-cycle cost management also creates incentives for innovation, inasmuch as resulting cost reductions are translated into profits (or lower losses). The very fact that the contract is for a long period of time means that the benefits of appropriate inter-temporal tradeoffs are reaped by the innovator itself, *i.e.* the contractor.

A key element in success is ensuring the existence of appropriate incentives for this to happen. Cost efficiency therefore requires contracts that span long periods of time.

4.3.3. Cost efficiency and quality

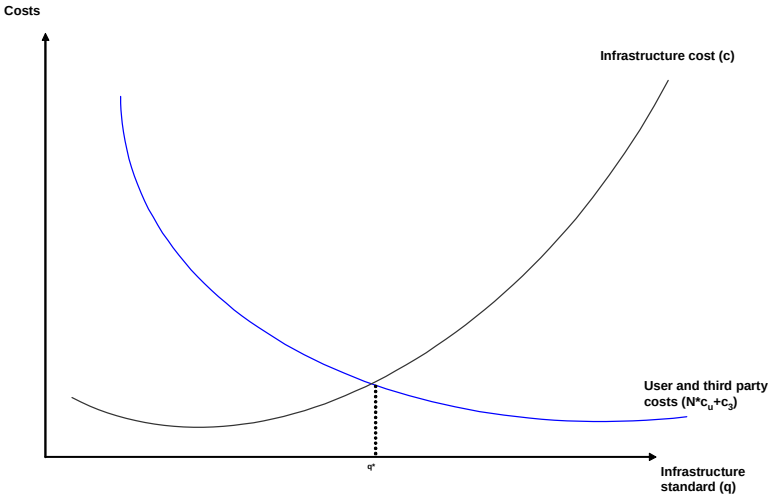
Different technical solutions and designs chosen for a project will affect future costs and benefits. An obvious risk in this is that short-term cost savings may jeopardise future quality, which would spill

over in the form of higher costs to users for using the facility (*e.g.* as a result of wear and tear on vehicles, longer travel time, *etc.*).

For this reason, a project contract should be designed to provide services at the lowest possible *social* costs. Higher infrastructure "quality" – smoother and safer roads and railways – is typically more costly to build and maintain than infrastructure with a lower standard, although higher quality will reduce users' costs at later stages. The costs to users of poor maintenance are potentially very large. For example, road users' vehicle costs on well-trafficked inter-urban roads (taken as an aggregate) can be between 10 and even 100 times higher than the costs for maintaining a road (Newbery, 1988, cited in Kopp, 2006).

However, there is still a point where the additional costs of building better infrastructure do not translate into commensurate benefits to users in terms of lower costs for using it. Cost minimisation must therefore seek an optimal balance between the counteracting components of the costs of investment and the costs resulting from under-investment. This point of balance is depicted in Figure 4.3 as q*. Efficiency calls for balancing the agent's own (higher or lower) maintenance costs, resulting in better or worse infrastructure quality (q), against (lower or higher) costs for users and third parties. In reality, the exact point where the sum costs to users and infrastructure providers is lowest may vary somewhat from the intersection between the two curves, depending on the shapes of these curves (see, for example, Austroads, 2006, Figure 2.4).

Figure 4.3. **Balancing the agent's investment costs against costs for users and third parties**



In particular, the following quality aspects must be accounted for in order for the contract to deliver efficient services:

- *Availability:* The purpose of infrastructure is to facilitate transport. Payments from the principal to the agent for new infrastructure must therefore be conditioned on lanes or sections becoming available for use. In addition, lack of availability due to maintenance activities or because of poor maintenance (*e.g.* inappropriate ploughing during winter, *etc.*) should affect the payment for services. Appropriately designed availability clauses could also provide incentives for undertaking maintenance activities during off-peak periods of the day or of the year.

- *Physical Quality*: The quality of travel deteriorates when physical quality gets increasingly uneven. This includes consequences for the time of a journey, for vehicle operating costs, riding comfort and safety. The contract must make sure that the contractor accounts for these aspects when considering alternative maintenance standards.

- *Safety*: Other parameters controlled by the contractor may also affect safety; examples include snow clearance, maintenance of street lights, signage markings and side-rails, and clearing side areas in order to reduce the risk of wildlife accidents. One way to handle this aspect is to specify tasks in the contract. In addition, it is feasible to benchmark observed accident risk against other, similar infrastructure specified in the contract, in order to penalise below-target performance and remunerate good behaviour.

- *Environmental concerns*: How infrastructure is constructed affects its impact on the environment. For example, the choice of material for a road's top layer may have consequences both for noise from traffic and the extent of particles worn off by studded tires. To the extent that the principal has information about these and other environmental externalities, these concerns should be included in the contract. This could be achieved either by way of direct instructions or with bonus/penalty conditions linked to the annual remuneration.

- *End-of-period standard*. When infrastructure is to be handed back to the principal after many years, it is important that it has been appropriately maintained. The original contract should account for this by stating some sort of functional quality at the time of return in order to curb the risk that the contractor would otherwise save on maintenance during the final years of the contract.

Section 9.4 addresses the importance of designing contracts in order to ensure that quality standards are maintained throughout the project.

4.3.4. Tendering to achieve cost efficiency

Any potential road builder can calculate the costs for a pre-specified project, but there is no straightforward way to say beforehand what the cheapest way to have it built is. In particular, different builders may suggest different cost levels and it is typically not straightforward to tell in advance what makes the best cost estimate.

The chief mechanism for cost minimisation is therefore to employ a competitive procurement mechanism, which should result in the project being contracted to the bidder that is willing to implement it at the lowest possible cost. A bid is, in reality, a commitment to undertake the pre-specified task at the amount submitted. It therefore provides relevant information about the cheapest way to have the project built.

Cost minimisation by the private sector is thus intrinsically linked to competition. There must be a "sufficient" number of participants in the process in order to discipline bidders to really press down their costs as far as possible.

To ensure cost efficiency, the production process must be adapted over time. One reason is that relative prices may change, making it necessary to use more plant and less labour, or vice versa. Another reason is that technological changes may occur that should be incorporated into the process. And a third reason is that a specific project may provide information about better ways to handle the production process in future.

There is, therefore, a strong element of innovation inherent in the search for cost-efficient ways to undertake projects. This is particularly so when a bid is being prepared for submission, as each bidder is seeking to get the upper hand in the competition and the procurer will thus benefit directly from the cost pressure. But it is also the case during the implementation and maintenance phases, when new methods may be developed. In these respects, the procurer does not directly benefit from the costs savings, but these primarily materialise as a higher profit (or possibly a lower loss). The procurer would, however, benefit by having access to better and cheaper ways to carry out future projects.

The presence of private financing may provide an additional incentive for cost minimisation, as private lenders – banks and other financial institutions – are likely to scrutinise the project in order to ascertain that the bidder is careful when preparing the bid and in carrying out the work as effectively as possible.

4.4. Summary

The primary justification for the use of one model for the provision of inland transport infrastructure over another is the extent to which it provides for greater allocative and productive efficiency.

Having defined the meaning of efficiency we now look at what qualities the different models identified in Chapter 1 have in this respect. Chapter 5 reviews these models against the normative framework given in the present chapter.

KEY CONCLUSIONS

- The key justification for the use of any alternative financing mechanism is the extent to which it provides efficiency gains, in comparison with other financing mechanisms.
- Government's first concern must be for ensuring that the model chosen for delivering infrastructure provides for relative allocative efficiency, in terms of the best overall use of resources. Investments should be undertaken when a project's benefits, taken over its life length, exceed the costs for building and maintaining the facility, i.e. when their Net Present Value is calculated to be positive.
- The aforementioned points mean that rigorous ex ante cost-benefit analysis should be applied to potential new initiatives, examining whether these expenditures provide greater net benefits than other potential uses of resources, the costs and benefits of different means of carrying out the projects, and the impact of different pricing schemes.
- Furthermore, to achieve productive efficiency, contracts should include both upstream (design and construction) and downstream (maintenance and operations) aspects of the project, and cover a long period of time, sometimes referred to as a lifetime contract
- The quality of the service to be provided must also be safeguarded. There is otherwise a risk that low costs will be achieved by reducing the standard of the infrastructure to the disadvantage of future users. Quality, in this sense, refers to availability, general standards, safety and environmental implications.
- Competitive procurement is the most effective means of ensuring productive efficiency where PPPs are concerned.

5. EFFICIENCY IN DIFFERENT MODELS FOR INFRASTRUCTURE PROVISION

5.1. Introduction

Having defined the meaning of efficiency in Chapter 4, we now turn to the models for the provision of infrastructure identified in Chapter 1 to assess their potential qualities with regard to enhancing efficiency.

It has been established in Chapter 4 that there are three main criteria that have to be met in providing infrastructure in order for resource use to be efficient, namely:

1. *Allocative efficiency (dynamic):* Investments should be undertaken when a project's social benefits, taken over its life length, exceed the costs for building and maintaining the facility.
2. *Allocative efficiency (use):* Where possible, prices should be set equal to marginal social costs in order to ensure that roads and railways are being efficiently used.
3. *Productive efficiency:* Investment and maintenance activities should be undertaken at the lowest possible costs in order to achieve the greatest possible benefits, with these concepts understood in the broadest, social sense.

In addition, it was established that an important element in determining the relative efficiency of the models is the extent to which they address the "agency problem". This means that the infrastructure provider (the agent) must be incentivised to deliver services in a manner that meets the needs of those who determine the need for this infrastructure (the principal).

In this chapter, we will confront some of these recommendations with the properties of the various models discussed. Our consideration of the models summarised in Figures 1.1 and 1.2 will, in this chapter, primarily focus on their ability to provide for improvements with regard to productive efficiency, as well as to manage the agency problem.

However, there is a close link between the allocative and productive efficiency of the models. This is because the benefit/cost ratio of a given investment will be higher if the cost for providing resulting services is lower. In this, the model must be designed such that cost savings are not achieved by sacrificing quality. The benefit/cost ratio is, moreover, also a product of the pricing mechanism employed; pricing issues are dealt with separately in Chapter 7.

Section 5.2 examines the benefits and limitations of providing infrastructure via a government ministry. Section 5.3 looks at simple outsourcing and Design-Build contracts as a means of overcoming some of these limitations. Section 5.4 describes the potential efficiency-enhancing elements of outsourcing using PPPs, as well as questions of *ex ante* and *ex post* analysis. Section 5.5 looks at devolution of responsibility for infrastructure provision to entities created specifically for this task. Conclusions are provided in 5.6.

It should be emphasised that this chapter considers the potential efficiency gains offered by the various models from a principal or theoretical perspective. The way in which these models are specifically designed and put in place to meet particular needs will be the final arbiter of the benefits achieved.

5.2. A Government Ministry

For the sake of comparison, the benchmark used when analysing the potential efficiency gains achieved by outsourcing and devolution is the situation in which all decisions are taken within a government ministry, and all activities – investment as well as maintenance – are undertaken using in-house resources. In reality, while this way of providing construction and maintenance is still used in some countries, most road infrastructure provision in OECD countries involves varying degrees of outsourcing, and most rail infrastructure provision involves devolution to entities with varying degrees of independence from government, which also practice outsourcing.

The benefit of a government ministry is that it allows for the greatest degree of political accountability – it is clear that the minister is responsible for everything that happens with respect to infrastructure provision. In addition, the agency problems described in Chapter 4 are – at least on the face of it – absent. The ministry has one set of coherent objectives that all employees are supposed to honour, and information is largely available to any person working there.

There are, however, downsides to this organisational structure. To a large extent these revolve around a lack of the specialisation that precisely results from the division of tasks between agents and principals.

A particular concern is that the ministry model mixes responsibilities between planning, oversight and implementation. It is not obvious that government staff responsible for resource allocation and policy setting can, at the same time, be experts in the detailed supervision of investment and maintenance activities or manage major procurement processes. Furthermore, infrastructure provision via a ministry means that elected officials can become entangled in a broad range of detailed operational issues.

Any government ministry has a huge set of responsibilities and is subject to numerous political and financial pressures in the allocation of resources. Moreover, a ministry is typically responsible for different sub-sectors (*i.e.* roads, railways, air, waterways, pipelines, and even communications), and the planning, administrative, regulatory and other responsibilities may each be specific to the respective sectors. For example, a transport ministry responsible for highway funding may also be responsible for funding other modes, for safety regulation and inspection, or even for issuing drivers' licenses, all of which will be in competition for resources.

A base budget typically exists for each ministry, which is applied on an annual basis, and additional funding must be fought for at the cabinet level by the minister responsible. The competition with other government priorities will likely be fierce and spending on infrastructure may not be given priority. In addition, it has already been noted that maintenance funding may be less politically expedient than other policy priorities, which may result in under-funding.

Government ministries are famous for bureaucratic decision-making processes, not least of all when they are large and have a wide range of responsibilities. In addition, the public service may be subject to numerous rules and arrangements that are not suited to the operational realities of handling dynamic transport undertakings and assets. For example, there may be limited use of competitive pressures to stimulate efficiencies in the provision of services.

Finally, big bureaucracies have at least implicit agency problems in that different ministries and even divisions within ministries can sit on information that is not automatically disseminated to others. Some officials may also have their own ambitions that could be in conflict with those of senior

management or of their minister. There may also be an agency problem vis-à-vis other ministries with a different mandate, such as the finance ministry.

It is precisely to overcome the inherent inefficiencies of tight public control over the provision of infrastructure that governments delegate responsibility by way of *outsourcing* and *devolution*. The following sections consider the potential benefits and limitations of the various available models under each of these areas.

5.3. Outsourcing by way of simple contracting out and design-build contracts

A first step towards outsourcing is to buy services on a piecemeal basis on the market. Private service providers are contracted to do what the principal – such as a ministry or agency – requests, on a limited, case-by-case basis. Having decided that infrastructure is to be built, the principal often also defines the design of the new facility (*e.g.* width, alignment, *etc.*), and sometimes also *how* the job is to be done in detail (*e.g.* how much blasting must be done, how much rock and gravel should be moved, the number of person and machine hours needed, *etc.*).

Where road infrastructure provision is concerned, many – especially developed – countries employ a model whereby a state organisation, such as a ministry or agency, controls the overall process, but outsources most of the actual works to private companies. As seen in the Annex, all such works are outsourced in New Zealand. Outsourcing could also be practiced by other infrastructure-providing entities, including state-owned or entirely private companies.

The prime benefit from simple outsourcing is that it introduces competition into the production process. The costs for doing the job with in-house resources can be compared with offers given by outside parties, and the contractor promising the lowest costs is chosen. In this way, it also allows for reductions in the overall cost of carrying out the work.

However, there are two important prerequisites for enhancing efficiency in this way:

- The assignment must be well specified. If not, it is still unclear what is to be done by the principal and the agent respectively, and cost comparisons become difficult.

- There should be several potential bidders that participate in a well-structured procurement process.

This underscores the significance of competition in this, as in all outsourcing models. If bidders are aware that there are several other firms that could build the infrastructure, there is reason for each of them to try to submit as low a bid as possible for doing the job. Indeed, *competition is key to delivering cost efficiency*.

The precise design of the payment mechanism is also important in achieving efficiency gains. A fixed-price contract – which means that the bid submitted is identical to the payment received – will foster cost efficiency, as the service provider is given incentives to do the job at low costs, inasmuch as any savings will improve the financial result. The down-side of the fixed-price contract is that it leaves all risk with the contractor. The discussion of issues related to risk and contracting is taken up in Chapter 6.

Simple contracting out means that the principal provides the details regarding the assignment. A next step on the outsourcing ladder is referred to as Design-Build (DB). This is different in that the

builder's control over the construction process is enhanced. In particular, the principal does not detail the design of a new facility, but leaves this to the contractor, to a much greater extent.

In this way, the prospective contractors are brought into the process at a much earlier stage. Project design is made into a joint effort between the principal and agent. A core idea in this is that the contractor's creativity should be brought into the designing of the project and, to that end, the process is made more flexible. As a result, costs may be saved as a result of innovation. Furthermore, there are also indications that DB procurement may speed up the construction process, since parts of the design can be done in parallel with the job being started. The same prerequisites for enhancing efficiency as under simpler outsourcing also apply here: well-specified assignments and genuine competition are of the utmost importance.

5.4. Potential efficiency gains from outsourcing via public-private partnerships

As noted in Chapter 1, PPPs are a more extensive version of outsourcing, involving the wholesale transfer of responsibilities for such elements as design, building, financing, operations and management, and their associated risks, over long periods of time.

In this section, we will first discuss three aspects of PPP projects: The bundling of construction and maintenance into one single contract (Section 5.4.1); the outsourcing of financing to the agent (5.4.2); and examples where the initial design and build elements of the project are not included in the arrangement (5.4.3). Then, in 5.4.4 we look at the public sector comparator as a tool for *ex ante* analysis. Finally, we conclude (5.4.5) by discussing *ex post* analysis of international experiences with the implementation of PPPs.

5.4.1. Long contracts, bundling construction and maintenance

Long contracts that include both construction and maintenance provide a key ingredient to achieving improvements in productive efficiency. Under the bundling approach, a profit-maximising concessionaire is expected to seek out the appropriate balance between up-front investment and future maintenance costs, resulting in the most efficient use of resources overall. This is because the contractor is typically better informed than the principal about opportunities to (re-)balance costs. This is thus a way to make productive use of the agent's information advantage.

There are, however, a number of prerequisites to achieving efficiency gains through PPPs. While these are briefly listed below, they are dealt with in greater detail in later chapters.

To begin with, risks have to be appropriately shared between the public and private parties, allocating each risk to the partner best able to manage it. Because the agent's performance may be difficult for the principal to monitor, risk transfer is a fundamental element of PPPs – by assuming the consequences of its actions the agent should be induced to pursue high levels of performance (Kain, 2002). The contract must also be designed to ensure that the risks, at the end of the day, are made to stick to the private partner when they are transferred (see Chapter 7).

Furthermore, the contract must be designed to ensure that overall cost savings are not achieved by sacrificing quality. This means that the principal must present the potential bidders with an appropriate project description in terms of the quality that is demanded; for example, availability, physical quality, safety and environmental aspects must be specified. In addition, there could be incentive mechanisms connected to these parameters, so that better quality is remunerated and sub-standard quality is penalised by variations in the payment (see Chapter 9).

Adequate competition is required to discipline bidders into submitting bids that are as close as possible to production costs (see Chapter 9).

Long contract terms are necessary, ideally in combination with an annual remuneration for maintenance activities. For example, it is appropriate to design the contract so that the builder will be in charge of the project over at least two renewal cycles (see Chapter 9).

The contract should also establish the performance standards required, but not be overly prescriptive with regard to how work should be done, thereby leaving room for innovation. This is often referred to as a performance contract (see Chapter 9).

Adequate legal and regulatory structures must be in place to provide a stable basis for the existence and functioning of the PPP. In addition, the public sector needs to have the appropriate competencies to negotiate and oversee these mechanisms (see Chapter 8).

5.4.2. Both bundling and financing

In most PPP arrangements, financing is also outsourced, along with the other project elements listed above. This means that the contractor must pay the very large up-front costs associated with building new infrastructure, usually by way of debt and equity financing, and is remunerated throughout the contract period as opposed to immediately after the new facility is opened. The builder thus becomes the "bank" for having the project built. For example, this is the "F" in the DBFO approach.

One justification for outsourcing the responsibility for financing is related to making the agent stick to the original contract. Given the long time periods involved, PPP contracts need to take account of possible changes in the context underpinning the agreements, which could lead to renegotiation. By asking the contractor to put forward its own resources, the government is at less of a disadvantage if and when renegotiation occurs. This question is covered more extensively in Chapter 6.

Transferring responsibility for financing may also lead to the acceleration of the construction of the project compared to government financing. The public sector approach typically means that a base budget is established for infrastructure construction over several years. Each year, approval is typically required by parliament to make necessary funds available. This may mean that the construction process is stalled for months while waiting for new allocations or for a new budget year to start. The outsourcing of raising finance disconnects construction from the budget process. Rather, the builder is keen to open the facility as soon as possible, since this means that performance payments can start being disbursed.

As discussed in Chapter 6, a key concern with this model is that commercial organisations typically have to pay higher interest rates than government. The aggregate savings from the PPP project must therefore be high enough to offset this higher cost for raising capital. At the same time, it should be noted that the difference in lending rates to the public and private sectors reflects the former's ability to cover any cost overruns by taxing, although the taxpayer would not be compensated for the additional costs; in other words, the private sector's higher interest reflects an internalisation of this risk. Furthermore, the interest rate differential does not exist in all cases and is not necessarily very high (Vining and Boardman, 2006). If the private partner's contract is not seen to contain high levels of risk, commercial lenders may offer loans with conditions that do not deviate very much from the rate that the public sector would have to pay.

In addition, lending rate differences could be mitigated by government loan guarantees. This will, however, create new problems in so far as the constructor's commitment is obviously reduced.

Guarantees may also make it difficult for debt to be considered off the government's books, an issue discussed in Chapter 3. Some governments have also sought to reduce the difference by way of tax-free status for PPPs (Vining and Boardman, 2006).

5.4.3. Other PPP models

Our description of PPP options in Chapter 1 noted the possibility of arrangements that do not include design and construction aspects of projects. In particular, there are various models that involve the outsourcing of operations, maintenance, on-going development and even the ownership of assets.

Examples are provided in the Annex, regarding the French and Italian motorways. Where French motorways are concerned, extensive responsibilities for entire motorway networks have been transferred to companies that are either entirely or largely privately owned. While there are commonalities with the full privatisation model described below, a fundamental difference is that the French model involves temporary arrangements based on short-term agreements, meaning that government has not transferred responsibilities in perpetuity, but has rather outsourced them temporarily.

Compared to the models described above, these concessions involve the transfer of mature assets, meaning there is no link between up-front building and downstream maintenance costs, with resulting life-cycle considerations. However, this does not prevent the operator from taking a long-term approach to asset management, which will obviously be conditioned by the length of the contract. Furthermore, any new works could be carried out based on a life-cycle approach.

Another important difference can be that, where many concessions are concerned, assets are transferred by way of the full or partial privatisation of an existing entity. As a result, there are no resulting benefits from competition for the market via a tendering process. However, this is not to assume that it would be impossible to tender a contract for maintenance and operation of an existing asset – this, in fact, is common.

Thus, key benefits in this model may, in fact, result from specialisation in the infrastructure task, which is more characteristic of devolution, as seen below.

5.4.4. Ex ante assessment of "value for money" – The public sector comparator

PPPs are typically seen as an alternative to "traditional" public sector procurement. As such, their use needs to be justified in terms of the extent to which they provide greater benefits versus costs than more conventional approaches. This is typically described as "value for money" (VFM). HM Treasury (2006b) defines VFM as "the optimum combination of whole-of-life costs and quality (fitness for purpose) of the good or service to meet the user's requirements". This is close to our own definition of efficiency.

The public sector comparator (PSC) is a widely used tool for making *ex ante* VFM calculations. The PSC is the hypothetical risk-adjusted cost of a project if it were to be financed, owned and implemented by government, which is used as a base comparison when considering PPPs and other options. It is intended to be a tool for ensuring that decisions regarding the use of private financing are based on sound economics, and long-term cost considerations. Private Financing Initiative (PFI) programmes in Australia, Ireland and the UK have incorporated the PSC as a fundamental element in the decision-making process regarding the use of "innovative" financing, and, as noted in Chapter 3, Portugal also implemented the systematic use of this tool after affordability problems with its SCUT motorway scheme. Indeed, the requirement for such comparisons was established by the UK's

Economic Development Committee as part of the so-called "Ryrie Rules", although this was later relaxed (Kain, 2002; see discussion in Chapter 3).

SG Hambros (1999) describes the basic elements of a PSC. The starting point of the analysis is the engineering cost estimates for conventional procurement. The analysis should cover the total life-cycle cost of the scheme including costs arising from planning, design, construction, routine and capital maintenance, and tendering costs. The next stage of the process is to consider the likely variability in each of the engineering cost estimates. The expected variability of realised cost, revenues and benefits relative to the engineering estimates is essentially a measure of the risk in the project. The cost variability can then be summarised using statistical methods, employing a statistical distribution around a mean or expected value for each cost. The results are then discounted to give the net present value (NPV) of the total project cost (see discussion in Box 4.1).

However, PSCs are not without their limitations. Edwards *et al.* (2004) note that the assumptions behind a given PSC may quickly become obsolete, especially when considering that PPP projects typically last decades. Furthermore, there are elements of the arrangements that do not lend themselves to *ex ante* financial analysis. Box 5.1 provides one example.

A technical issue of key importance is the discount rate employed for calculating the NPV of the project should it be carried out by the public sector. Fitzgerald (2004) notes that the rate initially used in the UK's PFI was 6%, and was changed to 3.5% in 2003. He also notes that, based on the UK's earlier rate, the discount rate initially used by the Australian state of Victoria was 8.65% for ten-year bonds. This was 5.7% over prevailing government bond rates to reflect a margin for market risk. He then goes on to add that there is a strong consensus among some experts that there should be no risk premium or risk-adjusted discount rates where there is no market risk transferred and no correlation between cash payments by the state and movements in the market, although some disagree with this. Indeed, the change in the UK rate was explained by an unbundling of the discount rate, separating the time-value of money from risk adjustments, because market risk was only transferred in a limited number of cases (Fitzgerald, 2004).

Given the amounts of money and lengths of time involved, the difference between 6% and 3.5% is significant, and could result in many projects being accepted as providing value for money at one rate, but as inappropriate when another is used. Fitzgerald (2004) thus recommends the unbundling of discount rates into: a risk-adjustment for estimated costs; an adjustment for the time-value of money, which he notes is best approximated by the risk-free rate applicable to government bonds; and, where market risk is transferred, an additional risk premium. In other words, a risk premium should not automatically be included. This underscores the importance of employing a rate that appropriately reflects the circumstances.

Fitzgerald also recommends that the PSC should be just one factor considered in conclusions regarding VFM. He also suggests that PSCs *not* be used in cases where a government has not conducted similar projects in the past, and thus where there is no basis for reasonable comparison. This is close to the NAO recommendation above, which implies that factors that cannot be included in the PSC need to be taken into account.

Box 5.1. Use of the public sector comparator in PPPs for the London Underground

The UK National Audit Office (NAO, 2000) looked at the use of the PSC in the context of PPPs for the London Underground. They note that a particular challenge lies in the fundamentally different approaches employed by the public and private sectors in terms of defining the objectives of a given project. Furthermore, they note three areas that are the source of limitations to the use of PSCs:

1. "Inherent uncertainty in modelling the costs of the London Underground infrastructure over 30 years.
2. The financial models alone would provide only limited guidance to the most likely cost of a public infrastructure operation.
3. The costs of public operation are influenced by the choice of financing scenario, including the availability and impact of bond finance and the costs of conventional public finance. Yet there is uncertainty about what some of these costs are and how they should be assessed."

Also, the degree of variation in the estimates was in the order of "several billion pounds", leading the NAO to conclude that "the modelling provides some useful information about the upper and lower bounds of public sector costs over the next thirty years but cannot reliably be taken to produce a single expected value within those boundaries."

In addition, many of the key costs and benefits may be very difficult to predict. For example, the NAO pointed out that the London Underground did not quantify the risk of legal disputes as part of its PSC for that reason. However, litigation in PPPs is both common and costly. They also noted that the assumption of a 7% efficiency saving as a result of using a PPP was based on limited evidence.

Finally, the NAO points out the existence of other factors that are "either difficult or impossible to quantify in financial terms", but which will nonetheless impact on the costs of different project implementation options, including:

- "Strategic issues" such as the potential benefits of access to "private sector efficiencies and skills", "clearer incentives" towards cost saving, and the loss of government's flexibility to respond to changing circumstances over time;
- The effectiveness of the contract structure to ensure that private partners deliver on commitments;
- Project design, with regard to whether it provides the appropriate incentives to ensure quality in keeping with public expectations;
- Public sector competencies to manage and oversee the PPP arrangement; and
- Effective risk management.

Deloitte & Touche Corporate Finance (2001) later looked at the same projects and issues. They note that the London Underground tendered PPPs for a 30-year period, while accepting that firm prices could only be predicted for the first 7½ years, and that the prices for the remaining 22½ years would be indicative only. In other words, the PSC for the full 30 years could not realistically be employed for comparisons with tenders.

Deloitte & Touche also criticised adjustments to the PSC – which were made with a view to incorporating certain, unforeseeable circumstances and which added up to GBP 2.5 billion – as being "judgmental, volatile or statistically simplistic". Furthermore, they see the range of NPV presented as being potentially misleading, as it did not highlight the fact that the most likely outcome is towards the lower end of the range. Finally, this PSC did not emphasize the potential efficiency gains of public financing via bonds, meaning that the private options were compared against a higher public NPV. In general, these points further emphasize the limitations of PSCs, as well as the importance of how they are designed and implemented.

The UK reformed the PSC in 2004, as part of its new VFM Assessment Guidance, to act as an instrument for identifying projects that would clearly *not* benefit from PFI financing, as part of a new tool known as the Outline Business Case (OBC). In an updated version of the Guidelines, in 2006, the PSC was replaced by a "Project Level Assessment" that looks at such questions as whether required risk is achievable, if project-specific elements might impede VFM, if there is sufficient market interest in the project, and if timeframes are realistic, as well as specific cost estimates (HM Treasury, 2006b; see the Annex for more detail).

Another point worth noting is that the full costs of a given model for undertaking an infrastructure project do not begin to accrue once the project begins. Rather, the preparation of the project, including conceptualisation, design, tendering and contracting, involves considerable costs. Also, each model will require a different role for government in terms of overseeing relations with the infrastructure provider and ensuring that objectives and contract provisions are met, and the creation of appropriate institutional structures also incurs costs. In order to attain a true comparison of different models, such administrative costs should also be considered. It is, however, particularly difficult to make these estimates in view of their development over time. For instance, any new model may be expected to be particularly costly the first time it is tested, after which the administrative costs for using it may shrink.

The conclusions from this discussion are not simple to summarise. On the one hand, there is a strong logic that governments should be able to present evidence indicating that a PPP design has a potential for delivering efficiency. On the other hand, it is very difficult to assemble appropriate information about a public sector comparator that could be compared to bids during the tendering process. The bottom line is, therefore, that any government should be aware of these complexities.

5.4.5. Ex post assessments of PPPs

The above discussion clearly indicates that there are aspects of PPP arrangements that do not easily lend themselves to *ex ante* analysis. A natural conclusion then is that *ex post* analysis is all the more essential as a means of exploring whether or not PPPs have delivered on the expected efficiency gains. However, despite the prevalence of PPPs in public discourse, there are relatively few *ex post* evaluations available.

The main reason for this is that infrastructure provision using PPPs is relatively recent. Projects are signed for long periods of time and none of the projects built during the last decade or two have come to their "natural" end, allowing for full *ex post* analysis, including of the entire life cycle (Blanc-Brude *et al.*, 2006).

A second reason is that the counterfactual is difficult to establish. In any *ex post* assessment a hypothetical alternative must be constructed regarding what would have happened if a particular

project had been implemented in a different way. It is obviously difficult to disentangle possible problems that are attributable to a particular project from what would have happened anyway.

Having said that, some efforts have been made, such as, *inter alia*:

- Various assessments, both by government and independent reviews, have occurred regarding UK Private Finance Initiative projects; some of these are referred to in the Annex (see NAO, 1998; Kain, 2002; Edwards *et al.*, 2005; HM Treasury, 2003; Shaoul *et al*., 2006).

- A number of concession projects were initiated in Latin America during the 1990s. There are some reports that evaluate these projects, one example of which is summarised in the Appendix A (Engel *et al.*, 2003).

- A review was conducted of the financing initiative in the Australian state of Victoria (Fitzgerald, 2004).

- Vining and Boardman (2006) have looked at PPPs in Canada.

- Sweden's Arlanda railway link has been discussed in a recent paper (Nilsson *et al.*, 2007) which is also summarised in the Annex.

- Dudkin and Välilä (2006) have looked specifically at the question of transactions costs.

Where they do exist, the analyses are far from overwhelmingly positive, although there is often a general recognition of the potential of PPPs. Fitzgerald (2004), for example, noted evidence of benefits from PPP financing, in terms of design innovation, timeliness of delivery and price certainty. However, he also suggests a need to rethink the focus with regard to where such projects might be appropriate, and for improvements in risk assessment.

Vining and Boardman (2006) go further, stating that the benefits are often outweighed by the transactions costs and "opportunism" in bidding, and they question the utility of trying to transfer risk to private partners. Notably, the concerns raised are often related to the practical application of these financing mechanisms, such as risk transfer.

Shaoul *et al.* (2006) are more categorically negative, based on an assessment of the first eight DBFO motorway projects under the PFI. They focus particularly on the high cost of risk transfer, casting doubt on the extent to which this could be justified in terms of efficiency gains. They also suggest that these arrangements may give rise to new sources of risk, based on financial arrangements undertaken by private partners that are not part of the original arrangement, such as refinancing or SPVs lending money to parent companies. Furthermore, they are strongly critical of the governance problems that they perceived in the arrangements they studied. In particular, they emphasize a problem in terms of the transparency of information resulting from arrangements involving the private sector.

The importance of contracting costs is not to be underestimated. Dudkin and Välilä (2006) estimate that the overall transactions costs related to the procurement phase of PPPs, including costs incurred by successful and failed bidders and government, are, on average, well over 10% of projects' capital costs. For PPPs in the EU's roads sector, the average bid costs for the winning bidder alone are about 3% of the project cost. This includes the costs of financial and legal advisors, which are particularly important given the complexity of this type of arrangement. While they do not compare this with traditional procurement, they note that there are a number of reasons why PPPs would engender higher transactions costs, such as the long-term nature of the arrangements, and their

complex ownership and financing structures, all of which lend themselves to more complicated procurement and monitoring processes. Furthermore, these estimates do not include additional costs due to contract monitoring and renegotiation. The issue of transactions costs is taken up again in Section 9.3.3.

Blanc-Brude *et al.* (2006) have addressed the problem from the perspective of comparisons of the *ex ante* construction costs of European roads using a PPP model versus those of "traditionally procured" projects. They conclude that the construction costs under PPPs are, on average, 24% higher than those resulting from traditional procurement. This is not surprising given that, as we have noted, a PPP is expected to result in a balancing of costs between the upstream and downstream elements of a project, in this case meaning that the additional money spent on construction should result in lower operations and maintenance costs. They also note that the 24% figure is comparable with Flyvbjerg *et al.*'s (2002) estimates of cost overruns in publicly procured major projects. Their assumption, then, is that the additional cost of PPP procurement is, at least partly, the price of avoiding cost and time overruns by transferring these risks to a private organisation that will be more susceptible to the consequences. In fact, Blanc-Brude *et al.* conclude that the *ex post* construction costs in PPPs and traditionally procured roads are close, meaning that the bulk of the difference in costs is precisely due to the transfer of construction risk, and not to the bundling of upstream construction with downstream maintenance.

In a similar light, HM Treasury (2003) found that 88% of PFI projects in all sectors were delivered on time or early, and with no cost over-runs on construction borne by the public sector. This compares with 70% of non-PFI projects delivered late and 73% over budget. In the transport sector alone, all eight roads considered were delivered early. One bridge was delivered on time and the other late. Two tram/light rail projects were delivered late and another on time.

The questions raised by these analyses underscore the essential nature of *ex post* analysis. It is thus strongly recommended that intensive, scientific and independent analysis occur looking specifically at the successes and failures of the different types of PPPs across countries and jurisdictions.

5.5. Potential efficiency gains from devolving control

Devolution was defined in Chapter 1 as a situation in which the various operational responsibilities related to surface transport infrastructure provision are placed under the aegis of an organisation specifically created for this task. That organisation should, to one degree or another, be independent from political leaders in its decision-making. Figure 1.2 showed various models of devolution, each involving a higher degree of independence from government control. These are discussed below.

5.5.1. A government agency

The first level of devolution is the creation of a government agency. An agency is still part of the public sector and is fully controlled by the government. In some instances it may report directly to parliament. The control is, however, on an arm's length basis and creates a principal-agent relationship between the two. To administer the division of labour, the ministry provides instructions regarding what it wants to see accomplished. This may be a document setting out the agency's basic assignment in combination with recurrent specific tasks. Often, the latter comes as part of the annual budget process by way of instructions for how the coming year's allocation is to be used.

Government agencies are often established to conduct works, which they likely do by way of outsourcing to private contractors. Agencies can also act as the principal, on behalf of government, in PPP arrangements.

A primary benefit of establishing an agency is that it involves greater specialisation in infrastructure provision, in comparison with retaining all control within a ministry. While the ministry's expertise is in transforming political will with respect to pricing and investment into a workable policy, the agency specialises in translating policy into an implementation process. This can be seen as a representation of Adam Smith's original idea of specialisation, applied to the organisation of the public sector.

For example, where a government decides that traffic problems are so extensive that they should be dealt with by building or upgrading roads, this can be done in a completely delegated way, by leaving the ultimate prioritisation of projects to the agency. It is then the agency that must design a planning process to make sure that the most valuable projects are built, *i.e.* the projects with the highest NPV. Since the agency specialises in a given area, such as road transport infrastructure, it is in a better position to assess the value of different investments in that area, as opposed to a ministry with a wide range of responsibilities. At the same time, the government may retain overall control over investments across sectors, for example, in education versus transport or in roads versus rail.

However, it seems to be rare to leave so much leeway to an agency. Instead, the ministry often leaves only the administrative process in the hands of the agency, while retaining the final prioritisation of investments with itself. In such cases, the agency is typically made responsible for organising the procurement process in a way that provides for efficient competition for the contract, as well as for other administrative tasks linked to the implementation of political will.

Furthermore, the government often retains control over pricing issues, which have a key impact on potential allocative efficiency gains. Control over and collection of tax revenue typically lies with the finance ministry, while control over specific investment and maintenance allocations is the responsibility of a separate transport ministry.

It is implicit in what was said in Section 5.2 that the ideal role for politicians should be in taking decisions, and not in implementing them. At least in principle, the agency's specialised officials are better equipped to pinpoint the best way to use the resources allocated to them by budgetary decisions. However, as public entities, agencies may still be subject to political interference with regard to decision-making.

Finally, compared to ministries, agencies are, in some countries, subject to different rules with regard to internal management – particularly where human resource management is concerned – and thus avoid some of the inefficiencies typically associated with government. In other words, agencies provide opportunities for injecting additional efficiencies into the process of providing infrastructure, while remaining under the direct control of the government. At the same time, their lack of financial autonomy does not resolve concerns regarding funding limitations and the need to compete with other government priorities.

There is, unfortunately, no fool-proof test to see whether the delegation of authority from a ministry to an agency enhances efficiency compared with keeping all decisions under one hat. There does, however, seem to be a world-wide trend in this direction. For example, the UK has split its previously large ministries into a number of agencies, and both Finland and Sweden have long-since had a central government structure with very small ministries and a large number of fairly strong agencies (Molander *et al.*, 2002).

5.5.2. Infrastructure fund

The collection and distribution of funds for the transport sector can be devolved to a public agency with its own governance structure, specifically created for this purpose. This often takes the form of road funds; an example from New Zealand is provided in the Annex (see OECD and ECMT, 2007 for a more extensive discussion, highlighting experience in Africa). However, it could also involve establishing funds for other aspects of the transport system or for transport infrastructure in general. As infrastructure funds in this sense involve the creation of a specific entity, they should not be confused with situations in which earmarked funds are disbursed by a pre-existing ministry or agency with a wider set of responsibilities. Furthermore, infrastructure funds are not instruments for executing works; rather, they channel resources to other entities responsible for carrying out building and maintenance.

Proponents of road funds see them as a means of creating a "quasi market" for infrastructure, linking supply, demand and available funding, while also engaging stakeholders in the decision-making process. In this way, potentially, a rational means can be achieved for providing what is largely perceived to be a public good (OECD and ECMT, 2007).

This approach also helps to avoid two of the primary limitations of more traditional government financing. To begin with, the establishment of a clear revenue stream allows for long-term planning that would not be possible in a system dependent on annual budget allocations. Furthermore, by concentrating decision-making regarding expenditures in the hands of a specialised body that is insulated to a greater or lesser degree from parochial politics, expenditures are more likely to be in areas where they maximise allocative efficiency.

Infrastructure funds can take various forms, and three different design features play a particularly import role in the extent to which they achieve the above goals.

The first is the governance structure. An infrastructure fund's management board can be comprised entirely of private citizens (as opposed to civil servants or politicians) representing different stakeholder groups; of government representatives, sometimes from different areas or jurisdictions; or of some combination of the two. Where a fund's board is made up of private citizens with a high degree of independence, it can closely resemble the private, not-for-profit model described below, although it is common for the board to be ultimately responsible to the relevant government minister. The chair of the board may be a minister or someone appointed by the minister, and there are also examples where the position is elected by board members.

The composition of the board, including the chair, will clearly impact on the degree of independence from politics in decision-making, as well as susceptibility to political interference. It has been suggested that the best practice would involve a board representing a broad range of interests, with an independent chairperson and appointees who have the support of, and can consult with, their constituencies (Heggie and Vickers, 1998).

A second issue is the stability of financing streams. By committing given revenues to the fund – such as fuel taxes – government is both ensuring a steady stream of funding to the sector, and tying its own hands with regard to future uses of those resources. Thus, the amount of revenues applied to the fund is a key decision. For example, a road fund may be comprised of all revenues collected in the sector, or just a proportion thereof. This relates to the complex discussion regarding what, exactly, the charge to road users should be; as noted in Chapter 7, fuel taxes are a blunt instrument that is not necessarily in keeping with the economically efficient use of roads. The concept of "Second

Generation Road Funds" developed by the World Bank speaks to some of these issues; in particular it envisages the following specific features:

- Charges should be established in addition to and entirely independent of the determination of levels of taxes on road users for general revenue purposes.
- Charges should be directly transferred into the fund, outside allocations from the general budget.
- The infrastructure fund should be managed by a board representing infrastructure users who would simultaneously determine the level of charge and the service.
- The users' board should decide on efficient internal allocation procedures to determine day-to-day allocation decisions (Gwilliam, 2007; OECD and ECMT, 2007).

The infrastructure fund may also be an instrument for undertaking borrowing on behalf of the government. Poland has recently established the National Road Fund (KFD), which will be financed from a special fuel surcharge, and will also be able to float bonds and undertake some borrowing, as well as use grant funds provided by the European Union.

A final issue is the nature of the actual executing agents. If the entity undertaking the works is not, in itself, efficient, the benefits of employing a road fund may be lost. This relates to the first issue, above, inasmuch as where a road fund is primarily directed by users and other beneficiaries, it may be assumed to have a particularly strong incentive to insist on the professional, cost-effective management of works. In the New Zealand case, the road fund funnels resources into another agency, responsible for planning works, which, in turn, outsources all specific activities. Africa reveals a myriad of experiences, including some cases where the resources are channelled into a government ministry.

The OECD and ECMT (2007) recently summarised the key arguments for and against road funds, which are closely related to the discussion of earmarking in Chapter 7. On the one hand, road funds can be seen as a threat to the ordinary budget process, limiting flexibility in fiscal policies. Furthermore, depending on their independence, they can lend themselves to abuse and be captured by political interests. On the other hand, if we accept that road (and other transport) infrastructure maintenance is chronically under-funded because it does not provide enough political pay-offs, these mechanisms are a means of avoiding the erosion of key public assets. The extent to which they genuinely lead to a more rational allocation of resources to infrastructure is highly dependent on their governance structures, and the sources and nature of their financing.

5.5.3. State-owned corporation

A further step in the devolution of control is to corporatise activities under a government-owned company operating under private corporations law.

As with the agency, the state-owned corporation offers options for improvements in decision-making with regard to which investments to make and when, by concentrating this responsibility in the hands of a specialised organisation. However, these entities go further, in that they typically are run like commercial firms, and are often more dependent on user charges and able to undertake private borrowing. They also employ the management structures of private companies, rather than of government bodies.

State corporations could thus be seen as a compromise between the need to accommodate the operational realities of a transportation network and to preserve accountability for public interest issues, achieving policy objectives in a commercial environment. In this way, the corporation allows for direct public oversight of potential abuse of monopoly power and of other public interest issues, while maintaining operational freedom. The fact that revenues do not need to be distributed to shareholders furthermore means that they may be reinvested into the infrastructure.

There are many examples of such companies in land transport infrastructure. Chapter 2 showed that they are the dominant form of providing rail infrastructure and services in many countries, including most of Europe and Australia. ASFINAG, a private company under public ownership, operates the motorway network in Austria, with individual borrowing powers but subject to government interest rates based on state loan guarantees (see Annex). The Annex also shows us the examples of Italy and Portugal, where the overall motorway network is in the hands of a state-owned corporation, but operated and maintained by private concessionaires. The Oresund Bridge between Denmark and Sweden was built and is operated by a corporation jointly owned by both countries.

However, it is also important to consider the limitations of state-run companies. Flyvbjerg *et al.* (2004) warn of the possibility that state-owned corporations could "fall between two stools"; in the worst of all situations, they might not be subject to the same transparency and accountability as other public entities, while also not experiencing the competition and pressure for performance of private firms. Indeed, they are typically not subject to the commercial discipline imposed by shareholders and equity markets, or to competition (KPMG, 2005).

Furthermore, not all state companies are created equally. There is a great divergence in the extent to which they are fully dependent on user charges, as opposed to subsidies. EU rules, for example, allow such companies and their debt to be considered independent of government only if their revenues cover at least 50% of their costs (see Section 3.4.1). Also, tariffs – where they are applied – are usually based on rates set by government, again limiting the full extent of commercial orientation. And, since the corporation is owned by the government, there is still room for political interference, which can come into play, for instance, in taking sensitive decisions regarding the need to limit certain services or cut staff. The precise functioning and independence of state-owned corporations is determined in their founding documents. This will, *inter alia*, establish whether they are free to take decisions about which investment projects to implement and if they are given control over prices to be levied.

Many state corporations are subject to requirements that create competitive-like circumstances, such as the need to produce profits and dividends, or simply to break even. They may also be put in direct competition with private sector firms. The Finnish Road Enterprise, for example, is owned by the public sector, but competes for business in construction and maintenance with fully commercial builders. Furthermore, banks exercise financial discipline on state-owned companies by determining risk levels and appropriate credit ratings.

5.5.4. The private, not-for-profit entity

Like a state-owned company, the purpose of a private, not-for-profit entity is to benefit from the virtues of commercial operations, while limiting the potential risks of outright privatisation. The UK's Network Rail and the Canadian St. Lawrence Seaway Management Corporation are the only such entities known in the transport modes under consideration in this report. Several examples exist in other modes, like airports, ports and air navigation.

Again, such entities benefit from specialisation. Furthermore, by virtue of their independence, they may have greater leeway with regard to pricing policies, although this is not necessarily the case.

The main distinguishing feature of the not-for-profit enterprise is that the infrastructure provider is managed by and on behalf of a balance of interested stakeholders, such as users, local businesses and communities. This should increase incentives to provide efficient service at affordable prices, meaning that the competitive forces of a market or government oversight are replaced by stakeholder control. Furthermore, operational decision-making is depoliticised, or at least subjected to direct input from a variety of stakeholder groups. Appropriate governance is thus achieved by way of careful selection of the board of directors to ensure that it is balanced and representative. Also, the board of directors can include representatives of various levels of government, which may be particularly useful in situations where the responsibility for, and impact of infrastructure is shared among different jurisdictions, as in a federal state.

Because any surplus is re-invested and not disbursed to shareholders, the incentives to abuse market power may be diminished, as compared to the for-profit model. This means that there is potentially less need for an elaborate regulatory regime.

As with state-owned companies, financial discipline may be imposed on not-for-profit entities by their need to borrow money privately. This will particularly be the case if loans are not backstopped by any other organisation. Also, the absence of equity investors may mean that the organisation must accumulate reserves in advance of investment needs to satisfy risk-adverse bankers or institutional investors, or to lower the cost of financing.

A main strength of the private, not-for-profit model may also be its main weakness: it is less beholden to the political process than other models and therefore less directly accountable to elected decision-makers. Thus, the application of this model must be carefully designed, as well as the enabling tools that will dictate its functioning and responsibilities.

5.5.5. The fully private owner-operator

The private owner-operator model offers the strongest incentives to enhance productive efficiency, as the owner has a clear interest in maximising the net cash flow of the corporation by minimising the operating costs of providing infrastructure services. An important additional source of discipline is the equity market, both to evaluate managerial performance and to eliminate incompetence and punish complacency. This market mechanism can swiftly change the management, and if necessary, the boards of directors of poorly performing companies.

However, the same clarity of purpose also means that any other, non-commercial objectives of interest to the public sector might not receive the required attention. Furthermore, the ceding of important national assets to private companies raises concerns from a governance perspective, particularly where these are essentially monopolies.

Privatisation means that government reduces its room for manoeuvring in ensuring that infrastructure serves public policy goals. This can be particularly important if there is a change in the overall context within which the infrastructure is provided. For example, if new trade routes gain importance, requiring the addition of new capacity in a given transport corridor, the government may be limited in its ability to ensure appropriate investment if the infrastructure is in private hands.

The private owner-operator model, when applied to transport networks, inevitably raises the issue of the regulatory regime to which the corporations should be subject. Given the essential role played by transport, this means that proactive regulation may be required to ensure that the public benefits of

transport are not unduly sacrificed in the name of shareholder value. Regulation may, thus, also be required to prevent abuse of market power while also allowing for sufficient profits to justify the operator's investments (KPMG, 2005).

The degree of regulatory oversight desirable on key issues, such as pricing, investment, and conditions for accessing the network, is a contentious issue. US and Canadian legislation, for instance, for many years provided detailed restrictions on the way in which prices were to be set by private freight rail operators, if branch lines could be closed down, *etc.* Current legislation is much more focussed on consolidation and mitigating the risk of market control by a few firms, such as by way of mergers and acquisitions. The need for regulatory oversight should also be seen from the perspective of the competitive pressure from other modes of transport.

There are limits to the practical applicability of the private owner-operator model where transport is concerned. To begin with, this model is currently only applied to rail in North America and Japan. In those cases, the provision of infrastructure is associated with, and funded by, the provision of rail services as part of an integrated package. Notably, these rail companies are often subject to some degree of competition in the market, both from other rail companies and trucking.

The term "privatisation" implies that a government has ceded ownership and control of an infrastructure network that has previously been in government hands, partially or completely. This indicates that the public sector played an important role in developing these assets at an earlier stage. Indeed, it is difficult to find successful instances of the fully private development of new land transport assets for public use. In other words, the fully private model seems most likely to be employed with regard to mature assets that were developed involving considerable public involvement (Adams *et al.*, 1998). Virtuosity Consulting (2005), for example, refers to the building of the Canadian Pacific Railroad as a Build-Own-Operate (BOO) arrangement, but also notes extensive government involvement by way of contributing land and underwriting loans. While private enterprise drove the development of small-scale rail investments in Sweden in the 1840s, government later stepped in to build additional trunk lines when it realised the wider public significance and value of this transport. A similar situation regarding rail in the UK was noted in Chapter 2.

The fully private development of large-scale surface transport infrastructure for general use is very rare. The UNECE (2003) has concluded that exclusive private funding of transport infrastructure is not the best option for bringing large-scale projects to fruition. In their view, the risks inherent to construction and operation, the long payback period on the infrastructure, and the uncertainty surrounding both the returns and the long term all militate against the successful private funding of such infrastructure.

5.5.6. General conclusions on devolution

The primary benefits from devolution seem to arise by way of the specialisation of tasks, concentrating responsibility for decision-making regarding inland transport infrastructure in the hands of organisations specially created to focus on this issue. This may result in better organisation of the principal-agent relationship, whereby government ministries can focus on their main area of competency – policy setting and oversight – and infrastructure providers focus on the details of getting the task done. A further benefit could involve depoliticising decision-making, and separating decisions regarding infrastructure from those in unrelated areas. Furthermore, many of the devolved entities are able to employ more commercial management practices, as well as private sources of borrowing and user charging that allow for more strategic, long-term planning.

This might give the impression that the greatest benefits are to be achieved by way of the highest degree of independence from government. However, it is also important to consider the need for accountability in the administration of key public assets, with important implications for other sectors of the economy and society. In other words, there is a need to strike a balance between the efficiency gains of independence and depoliticisation on the one hand, and the need for appropriate public oversight on the other. With this in mind, the greater the degree of independence from government, the more complete regulation must be to ensure that public interest issues are considered.

5.6. Conclusions: Applying efficiency

Government's fundamental consideration in undertaking any investment should be: "Does this initiative represent the best use of society's resources, compared to any and all other initiatives?" The choice of which investment to make, with a view to maximising allocative efficiency, is a fundamental sovereign responsibility. Once that choice is made, the primary consideration in choosing a model to carry out this initiative should be: "Will this approach provide the best value for money, compared to any and all other approaches?" This process is complicated because the assessment of the relative allocative efficiency of different investments must also include consideration of how they would be carried out, with a view to understanding the potential costs and benefits of each.

An unregulated market cannot automatically be expected to provide road and railway infrastructure in an efficient way. It is, therefore, the sovereign task of the government to intervene in order to ensure that this happens. However, because of the generic agency problem, governments cannot simply tell people or companies to operate according to these targets.

In general, PPPs provide the potential for productive efficiency improvements by way of ensuring a life-cycle approach to infrastructure provision. They also allow for some possibility to better manage the agency problem, to the extent that given aspects of the overall task of infrastructure provision can be assigned to parties best able to implement them.

A prime requirement in order for outsourcing responsibilities to commercial agents to be beneficial is that there be sufficient competition *for* the project. Effective competitive procurement is thus essential; this issue is dealt with further in Chapter 9. At the same time, the project must be carefully designed to optimise the trade-off between the costs and benefits of different technical solutions, including the optimal transfer of risk and sufficient quality control, issues discussed in Chapters 6 and 9, respectively.

In contrast, devolution may be able to provide efficiency improvements primarily because it allows for the specialisation of tasks while still retaining varying degrees of government control and accountability, but also reducing opportunities for political interference. There are also opportunities to improve life-cycle cost management, although to a much lesser extent, inasmuch as devolution typically applies to infrastructure that is already built. The same may be said of PPPs that focus only on maintenance and operations.

Devolution and outsourcing models are not usually alternatives to one another as means of meeting a specific infrastructure challenge. As we saw in Chapter 2, PPPs are often applied to new infrastructure involving specific links, as opposed to whole networks. In contrast, devolution is often applied to mature infrastructure, and is common where entire networks are concerned, as are PPPs that involve only the transfer of operations and maintenance.

Furthermore, there are a number of instances where devolution and outsourcing – including PPPs – are combined. The Annex shows examples from Austria, Italy and Portugal where the overall

road or motorway system has been devolved to a state-owned company, but elements of it are operated by fully private firms, based on contractual relationships.

In short, while there is clear potential for achieving efficiency gains via outsourcing and devolution, the efficiency of each model will depend much on the details of how it is designed and implemented. In this, essential questions include the degree of risk transfer, means of tendering, pricing, regulation and oversight, all of which are considered in later chapters.

KEY CONCLUSIONS

Public-private partnerships

- PPPs for the provision of inland transport infrastructure offer potential opportunities with regard to achieving productive efficiency gains by taking a life-cycle approach to costs, and better managing the principal-agent relationship by placing specific responsibilities in the hands of parties best able to manage them.
- Thus, productivity gains are most likely achieved by linking upstream design and building functions with downstream maintenance and operational activities.
- Additional benefits also may be achieved from the outsourcing of financing, in that this provides for greater commitment to the project by the private partner, and can result in bringing the infrastructure on stream more quickly. However, the additional costs of this – notably as a result of higher interest rates – also need to be considered.
- Outsourcing of the operation and maintenance of existing infrastructure offers benefits in the form of placing the assets in the hands of a specialised entity. However, there will be less potential for efficiency gains via life-cycle cost management, in comparison with other types of PPP arrangement.
- At the same time, outsourcing creates new principal-agent tensions, inasmuch as public and private organisations cannot be assumed to pursue similar objectives. Thus, projects and contracts must be carefully designed to ensure that lower costs are not achieved by sacrificing quality.
- While the Public Sector Comparator (PSC) is a useful tool for contributing to the *ex ante* calculation of the value for money that could be achieved by way of a PPP, it has its inherent limitations. For instance, much caution is required in choosing the appropriate discount rate to calculate the net present value (NPV) of the project were it to be carried out by the government.
- There is a need for rigorous, cross-country, ex post analysis of different experiences in the application of different PPP models for the provision of infrastructure, examining, in particular, the efficiency gains achieved.

Devolution

- A major potential benefit of devolution is found in placing assets in the hands of entities that specialise in managing them. This can lead to allocative efficiency gains, as specialised organisations may be better placed to take decisions regarding which investments should be made, and when, in their areas of responsibility.
- There is also room for productivity gains in devolution by way of life-cycle cost management, although it should be noted that devolution typically applies to existing infrastructure, meaning that the design and build stages are not linked to downstream maintenance and operations costs.
- A primary concern where devolution is concerned is in establishing an appropriate balance between the public accountability of the infrastructure provider, on the one hand, and its independence, on the other.
- In reality, the above-noted points establish the basis for potential efficiency gains, but the extent to which a given infrastructure provision model is efficient will be largely conditioned by how it is designed, including its conception, tendering, contracting, pricing, related legislation and regulations, and the means by which, and how well, it is overseen by the public sector.

6. RISK SHARING IN PUBLIC-PRIVATE PARTNERSHIPS

6.1. Introduction

The question of risk is fundamental in the consideration of PPPs. One way to define PPP arrangements is as mechanisms for the premeditated sharing of risk between public and private partners.

In this chapter we will look at the tradeoffs involved when risk is shared between the principal and the agent. Focus is on the principal-agent relationship and on cost efficiency aspects of risk allocation, as well as on how this issue may be managed in contracts.

The analysis will be based on a description of what constitutes risk in infrastructure projects (Section 6.2). Thereafter, the overall principles for efficient risk allocation are dealt with in Section 6.3. Based on these, Section 6.4 formulates some specific recommendations for how risk, in practice, should be managed in PPP contracts. Section 6.5 addresses the risk for renegotiation. Section 6.6 concludes.

In initiating this discussion, it is important to note that there will be many situations in which the costs of transferring risk are perceived as being higher than any potential benefits, meaning that PPP models are unlikely an option. This does not preclude possibilities for improving efficiency to some extent. Indeed, it may be precisely at such a point where governments may wish to seek out efficiency gains by way of the various devolution models analysed in Chapter 5, which do not involve high degrees of risk transfer. Alternatively, more limited forms of outsourcing might be considered.

6.2. The nature of risk

Risk is defined as *any uncertain but quantifiable consequence* of an activity, be it in terms of costs or benefits. Risk is, according to this definition, something that can be quantified – a numerical calculation of an uncertain benefit or uncertain cost in terms of its magnitude, timing and probability of occurrence. Uncertainty is a wider concept, which also includes risks that cannot be quantified or where the probability for different outcomes cannot be estimated. It is, indeed, the transfer of a vague uncertainty into a precise, calculated risk that makes it possible for a private sector partner to accept that the risk be handed over from the public partner (Riess and Välilä, 2005).

Infrastructure projects may include, *inter alia*, the following types of risk:

- *Design or technical risk* – Problems resulting from design failures or from inadequate engineering. An example could be that a design is chosen that, during some future period, will result in high maintenance costs.

- *Construction risk* – Whether or not the project gets built in a diligent way, on time and within budget.

- *Availability risk* – Whether the infrastructure is available for use as required. This also includes performance problems, such as inferior quality and safety.

- *Demand risk* – Variations of future demand and whether the use of the infrastructure and resulting revenues is in keeping with the projections before it was built. Demand above expectations may also make future maintenance costs higher than expected.

- *Operating risk* – Changes in the projected costs of operation and maintenance. This may, for instance, be due to the fact that the construction design, after a few years, proves to be inappropriate and requires more spending than anticipated.

- *Encashment (Enforcement) risk* – Ensuring that users pay when they are supposed to.

- *Financial risk* – Inadequate budget and financial management of outstanding debt, and variations in financial circumstances, such as interest rates, exchange rates or inflation.

- *Political risk* – Changes in the political situation, altering the terms under which the infrastructure is provided or used. This could include policy changes leading to new costs, such as the introduction of new environmental standards, *etc.* Other examples include the nationalisation of assets, terrorism and war.

- *Environmental risk* – Unforeseen adverse environmental impacts resulting from the creation or use of the infrastructure. This may also include the fact that the public's concerns over the environment may change over time, resulting in alterations to the way in which an asset is handled.

- *Force majeure* – Unforeseen events that impact on the infrastructure and its use, including natural disasters.

It is also useful to make a distinction between whether risks are *global*, or if they can be thought of as internal *project risks* (Välilä *et al.*, 2005). These concepts are described as follows:

Global risks:

Many truly external risks are impossible to eliminate, or indeed even anticipate at the contracting stage. These risks are thus beyond the direct control of either party. Examples include political risk, such as changes in policy due to a change of governments, which could lead to fundamental alterations to the basic conditions underlying a project. A new government could, for instance, reject established tolls. Terrorist attacks or the outbreak of war are further, more extreme, examples. *Force majeure* is another type of risk that is beyond the control of any of the partners; examples include extreme weather events or other natural disasters. Demand risk can also be said to be external to both parties to a contract, in that it is strongly affected by GDP growth and fuel price variations, as well as by non-predictable events, such as natural disasters or terrorist attacks (*i.e.* political risk).

Project risks:

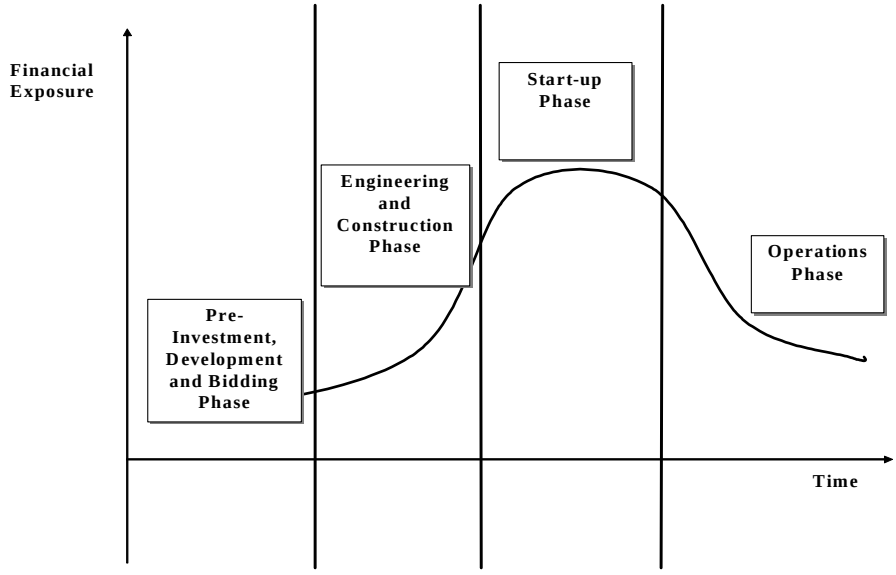
Project risks are, by definition, those that the parties can control. For example, construction risk is related to the diligence applied in actually undertaking the tasks contracted for. It includes both the risk that costs may exceed projected levels and that a project is not opened on time. Construction risk may also be related to the pre-construction or design phases when, for instance, the geotechnical preconditions of a project are analysed.

Operating risk is largely a function of the costs that can arise from how a facility is built. The better the preparations, ground work and quality of installations, the smaller will be the future maintenance costs to the contractor.

The same type of argument is valid for availability risk. Parts of the infrastructure may be closed or in other ways made unavailable to users as a result of, for example, poor initial design and building or poor maintenance. Poor planning of activities, such as carrying out maintenance during times of heavy use, is another possible reason for infrastructure not being available.

Risk is not evenly spread out throughout the life cycle of infrastructure. Typically, risk levels increase throughout the development of a given project, when more resources are tied up, peaking at the start-up phase, as illustrated by Figure 6.1. Furthermore, the risk distribution is likely to vary depending on the nature of the project – where demand risk is transferred it may be in the operations phase that risk is greatest. Also, it may be precisely during the operations phase that the partners realise that the revenues will not be enough to cover the costs incurred during development.

Figure 6.1. Levels of risk in different phases of a given infrastructure project



This discussion could have various implications for different types of models. On one hand, it could be argued that arrangements only including maintenance and operations involve much less risk, as the earlier elements of the life cycle are not involved. This is comparable to, for example, the transfer of motorways to fully private operators in France, Italy and Japan, or the full privatisation of some existing rail networks in North America (see the Annex for examples). On the other hand, in a PPP arrangement that covers the full project life cycle, the private partner should be more aware of risks that could arise in the operations phase since such risks may emanate from the same company's design and building methods.

6.3. Principles for the efficient allocation of risk

The cost for risk is comprised of a probability times a cost component. For example, hypothetically, the chance that there will be heavy rains during a critical moment in a bridge construction project could perhaps be 0.001. The extra cost if this happens is, perhaps,

1 million currency units. The expected cost (not accounting for risk aversion) is then (0.001*1 000 000=) 1 000 currency units. A fundamental assumption behind risk transfer is that it is possible to reduce the costs associated with this risk, *i.e.* by reducing the expected cost below 1 000 in the above example.

It is generally accepted that each risk should be assigned to the actor most capable of managing it, and an essential assumption in the process of outsourcing activities is that private organisations are more capable where certain risks are concerned. This is due to the inherent profit motive of private companies, which makes them constantly search for ways to reduce unexpected costs. It is also due to the fact that the agent is closer to the activities, and therefore knows more about the opportunities for cost savings that are available.

In contrast, public organisations do not suffer the same consequences of poor outcomes, in the form of bankruptcy or pressure from shareholders. If a contractor must bear the consequences of poor design, building and maintenance, it will logically take greater care in avoiding lapses in these areas. This is closely related to the arguments in Chapter 5 regarding the benefits of arrangements that link design and building responsibilities with operations and maintenance.

Given this, an initial question is which of the risks identified in the previous section are better managed by private partners? On the face of it, it seems that project risks should be allocated to the private contractor and global risks should be retained by the public. In reality, this conclusion is often too simplistic.

To begin with, the above discussion outlines the theoretical basis for risk transfer. In reality, many companies may be highly risk averse. This could be precisely because, as opposed to the public sector, private actors bear the consequences of risk more personally (Vining and Boardman, 2006). In this case, if the risk cannot be made to "stick" to them, it should not be transferred. This question is revisited in Section 6.5.

A further reason for not uncritically allocating project risk to the agent is that such risks may, to some degree, be subject to elements beyond the private contractor's control. For example, while construction and availability risk should, *a priori*, be the domain of the private company building and operating the asset, government policies and actions can have an important impact on the expected costs for construction. For example, the government may not have attained appropriate approvals for a project, or legal challenges may prevent work from going forward. This could have costly ramifications for both construction and availability and may make full risk transfer inappropriate.

Furthermore, even though some global risks are beyond the private partner's ability to eliminate, it may be possible to hedge against negative risk realisations. It is thus not risk *per se* that is the prime concern, but rather the cost expected if a negative realisation of risk takes place. There are several ways to reduce this cost:

1. *Measures to eliminate the source of risk*, such as by way of specific design and building elements, like the construction of two separate tunnels to eliminate the risk for collisions between motor vehicles or trains.
2. *Measures to reduce the risk.* For example, well-kept road markings reduce the risks for traffic accidents, but will not eliminate them.
3. *Measures to limit the negative consequences of risks.* Protective devices around bridge pillars or rules that make the pillars withstand a collision are examples. Appropriate drainage and coverage to protect a construction site against bad weather are others.

4. *Transfer of cost consequences of risk by way of insurance.* There may be possibilities to eliminate the cost consequences of negative risk realisations by way of standard contracting with insurance companies that hedge against negative outcomes.

This line of reasoning also means that it may be feasible for an agent to live with the consequences even of extreme events. Indeed, in many circumstances where there is some risk for terrorism or extreme weather, it may be reasonable to consider the possibility of mitigating their impact in the development and management of the original infrastructure. It is, therefore, not obvious that the contractor should be exempted from all costs related to global risks. However, the precautions required for mitigating such risk may be costly, and should be factored into the overall cost-benefit analysis of the arrangement.

With the above reasoning in mind, Virtuosity Consulting, (2005) outlines a proposal for rules-of-thumb for how risks could be shared in PPP arrangements, which is summarised in Table 6.1. Since each project is distinct, as are its risks, the question of risk transfer should, however, be approached on a case-by-case basis. In fact, if each type of risk is considered in isolation, the true ability of partners to manage it is likely complex. The table should therefore be interpreted with great care.

Table 6.1. Typical infrastructure PPP project risks and hypothetical allocation

Risk Category	Example	Partner Likely Well-Suited to Manage Risk
Force Majeure	Loss from war and natural disasters	Public
Regulatory/Political Risk	Delay in project approvals, land acquisition, changes in law/policy affecting revenue	Public
Revenue/Demand Risk	Deficient revenue due to low traffic volume or lower price due to demand elasticity	Mostly Public – Some Private
Design/Technical Risk	Engineering or design failures	Private
Construction Risk	Cost escalation due to delay or faulty techniques	Private
Operating Risk	Costly operation and life-cycle maintenance	Private
Environmental Risk	Damage and liability/mitigation costs from adverse environmental events	Private
Financial Risk	Costs of inadequate revenue hedging and debt management	Mostly Private – Some Public
Project Default Risk	Project bankruptcy from any/all of the factors above	Shared Public/Private

6.4. Contracting to manage risk

The previous section discussed the principles for risk allocation between the parties. This section seeks to apply these principles. Section 6.4.1 therefore discusses the scope of the private sector's involvement, referring to the distinction made between different types of contracts discussed in Chapter 5, namely *simple contracting out*, *Design-Build*, and different types of *PPPs*. Thereafter, the use of fixed-price contracts and the arguments against putting all costs within the fixed-price framework are addressed (6.4.2). Finally, techniques to share demand risk are reviewed in Section 6.4.3.

6.4.1. Scope of private sector acceptance of risk in outsourcing

The first element considered in risk management within outsourcing arrangements is the scope of the private partner's involvement in the project. Private partners will be motivated to increase efficiency across the life cycle of the project by the extent to which they are made responsible for the outcomes of their actions.

From a risk perspective, simple contracting out means that the principal has strong control over project design. This often includes specifying *how* the pre-designed road or railway should be built, with bids submitted by way of unit prices based on volume estimates made by the principal. In this case, any unexpected changes compared to the project specification will have to be paid for by the principal. The agent is only responsible for due diligence in construction.

Design-Build contracts mean that the builder is brought into the process at an earlier stage. It is therefore possible to make the contractor liable for cost increases that emanate from decisions taken during this early phase.

It is even more obvious that operational risk can be transferred to the contractor if a life-cycle PPP model is used, as this means that the agent controls both the way in which the asset is built and the consequent operating costs. More precisely, the more the contractor gets involved in the project specification and design, the stronger is the theoretical argument in favour of PPPs in general, and BOT designs in particular. It is, in other words, reasonable to have a contractor in charge of both initial construction and maintenance of an existing road network carry unexpected cost increases that are due to flaws in the original work.

Of course, the contract must fully implicate the private partner, and include provisos that ensure that cost savings are not achieved by sacrificing quality. Chapter 5 noted the necessity of designing performance criteria that the contractor must fulfil in order to be remunerated for the services that are made available by a piece of infrastructure. It is also necessary to develop tools and mechanisms to monitor performance, in particular with respect to ensuring that the standard of the infrastructure is satisfactory. These points are given more consideration in Chapter 9.

This is particularly important given that most infrastructure assets last for a very long. For several reasons, a PPP contract may cover a shorter period of time than the lifetime of a road, however that is defined. This may jeopardise the effort spent on maintaining the asset's quality, in particular towards the end of the contracting period. The preventive maintenance activities that affect the pace with which a road deteriorates can be scaled down if the responsibility for the road, and therefore the benefits of the activities, are going to be transferred to someone else, resulting in a suboptimal standard at the time of the transfer. In order to avoid any problems in this respect, the targeted infrastructure standard at the end of the contracting period must be detailed in the initial contract and must be monitored before transfer.

As a final point, a conventional contract relies on an adversarial procurement process, with claims engineers acting on behalf on the principal and other claims engineers on behalf of the agent. If, on the other hand, the contractor has control over how a project is designed and built, this process will have to be internalised within the construction company, or between that company and its sub-contractors.

6.4.2. Fixed-price, cost-plus and incentive contracts

As a second key element, in order to understand the actual mechanisms that are used for sharing risk between principal and agent, it is necessary to consider the precise way in which the agent is

compensated for participation in the project, and, therefore, for assuming risk. There are two extreme versions: *fixed-price* and *cost-plus* contracts.

Fixed-price contracts mean that the amount paid to the private partner does not vary whatever the outcome; a bidder has won a procurement tender and will receive remuneration equal to the winning bid. The fixed-price contract has two essential features:

- *It provides maximum incentives for the agent to minimise costs, subject to any and all provisos made in the contract.* The agent will make every effort, understood in a broad sense, in the preparation and implementation of the work, as any lower cost or higher revenue will increase profits.

- *It leaves all unspecified risk with the agent*. Any event not accounted for in the contract that increases costs compared to projections made before submitting the bid will only have consequences for the agent's financial result.

These qualities of a fixed-price contract are, of course, obvious for the participants in the bidding process. An important part of the preparations before submitting a bid is therefore to identify the principal sources of risk (corresponding to the list in Section 6.2 above) and to calculate the costs under both average and worst possible conditions. The bid that is submitted therefore comprises some provision for adverse consequences, and thus due attention is given to the possible ways of affecting the costs of negative risk realisations. The bid also contains some degree of extra compensation for carrying risk.

In reality, fully fixed-price contracts are rare. This is partly because, as noted above, some of the risks are not appropriate for transfer. In addition, a private company may need such a high premium to agree to this type of contract that the costs would outweigh any benefits. Furthermore, unforeseen events with a very high cost could threaten the private partner with bankruptcy, leaving the principal with the unpleasant choice between subsidising the project and managing the repercussions of failure.

The extreme opposite of a fixed-price contract is one that is based on "going concern", often referred to as a *cost-plus contract*. The contractor is paid for the costs that materialise, irrespective of what these are. The cost-plus contract obviously has the opposite properties from the fixed-price contract in that the principal retains all risk and the agent is no longer motivated to be prudent with respect to costs.

Blanc-Brude *et al.* (2006) suggest that many simple contracting out arrangements are, in reality, of a cost-plus nature. Even though the formal contract is signed for a fixed remuneration, the principal's control over project specification makes it impossible to let the contractor bear the burden of cost overruns, thereby reducing the latter's incentives to avoid problems. Since this form of contracting and remunerating is commonplace, it could be one important explanation for cost overruns in public sector projects.

An *incentive contract* is defined as a contractual device somewhere on the scale between the two extremes of fixed-price and cost-plus contracts (Laffont and Tirole, 1993). The operational component of an incentive contract is the cost-sharing parameter $0 \leq ß \leq 1$ with $ß = 0$ being a cost-plus, and $ß = 1$ a fixed-price contract. To illustrate, assume that $ß = 0.5$, and that the contract is for a cost of 100 currency units. Assume further that the actual outcome is 80 or 120. In the first case the agent is paid 90 and has to suffer a loss, while the second case results in payment of 110 and a profit.

With the incentive contract, the private partner's potential losses and gains are not as great as they would be with a fixed-price contract, and the public sector is not as exposed as it would be with a cost-plus contract. However, the incentive contract obviously reduces the motivation to save on costs compared to the fixed-price contract, but also alleviates risk. It is, in a way, a compromise solution between the extremes.

The question addressed by the literature, and of direct relevance for the present analysis is, what *should* affect the value of ß? What is the efficient way to split risk between principal and agent, accounting for the need to provide incentives to be both cost efficient and to cap risk? There is a vast literature on this topic, and recommendations can be summarised in the following way (based on Milgrom and Roberts, 1992):

i. The higher the value of the contract, the more important it is to induce the agent to exert much effort, *i.e.* to let ß move towards 1 and make the contract almost fixed-price.

ii. The easier it is for the agent to carry risk, the higher ß should become. This may provide an argument for an almost fixed-price contract for large entrepreneurs, while the small contractor may have to be offered a contract with less risk. It also provides the basis for saying that the public sector, with its large portfolio of projects in different sectors typically is better placed – ceteris paribus – to carry risk.

iii. The smaller the cost uncertainty – i.e. the smaller the ex ante expected variance of costs – the higher ß should be.

iv. The better the entrepreneur's ability to affect cost turnout, the higher ß should be.

There are few examples of incentive contracts. However, the theoretical analysis still has an important message for the way in which real-life contracts are designed, since there are contractual clauses other than the risk-sharing parameter that can be used as instruments for dealing with risk. More precisely, most contracts approximate the fixed-price contract, but still differ in that they cap some of the risk that would otherwise be left with the contractor.

One way to do so is by way of cost components that are singled out to be handled differently from others. Most contracts, for instance, condition payment on price level changes by way of some price index. This is a way of saying that the principal will carry the uncertainty relative to inflation in general, or a specific price in particular. Neither party to the contract can do much to affect price level changes, but the public sector principal, given its size and diversity, probably has fewer problems living with this risk than a commercial firm (argument ii above). Indexing for price-level changes means that the bidder will not need to build in additional costs to cover unexpected inflationary shocks in the bid.

Another example of the same nature concerns a contractor's remuneration for maintenance costs that materialise after a project has been opened for traffic. This cost can be conditioned on traffic growth, meaning that if traffic increases by more than X percent per year, the agent will get an extra reimbursement. In effect, this makes the principal accept the cost consequences of unanticipated traffic growth.

There are also examples where single cost components in a contract are dealt with separately from all other costs under a fixed-price construction. The remuneration for running subsidised ferry services, for instance, comprises bunker oil as one of its major operating costs. This cost can be excluded from an otherwise fixed-price contract and be paid on going concern in order to reduce the

need for the agent to estimate future changes in the world market price of oil. This can be seen to illustrate argument (iii) above, with bunker oil being the more uncertain cost component in the deal.

But this example also illustrates the problem with eliminating some costs from the fixed-price scheme. If oil were also included in the fixed-price remuneration, there could be ways to affect the amount of oil used and, thus, to counter increases in its price, resulting in new efficiencies. A cost-plus clause in the contract eliminates incentives to save on costs.

The fixed-price contract has a strong appeal in that it induces the winning bidder to be prudent with costs. There are, however, several situations where the consequences of a fixed-price design may be adverse, such as those where large risks would force bidders to submit very high bids. It is thus important to consider, during the period when a PPP project is being developed, if there are parts of the risk that should be retained by the principal, *i.e.* exempted from the fixed-price structure.

6.4.3. Sharing demand risk

It was noted above that demand is heavily influenced by factors that are beyond the control of both the private contractor and the government. Demand is clearly difficult to predict; Flyvbjerg *et al.* (2006) found that in nine out of ten rail projects studied the passenger forecasts overestimated actual travelling, with the average overestimation being 106%. For roads, they found that 50% of projects experienced a difference between forecasted and actual traffic of +/-20% and 25% had a difference of +/-40%. Indeed, it could be argued that, where demand is highly variable, it becomes more of an "uncertainty" than a "risk", according to our definitions in Section 6.2, inasmuch as it is not possible to attach reasonable probabilities to possible outcomes (Kain, 2002).

One reason for transferring demand risk to the private partner is to ensure greater rigor in demand projections. If a private company is to seek loans from a financial institution, the latter will demand a strong case for providing this credit.

However, the validity of this argument is undermined as soon as the government guarantees the debt. Furthermore, this could lead to publicly backed loans being applied to projects that would not otherwise have stood up to public scrutiny. Kain (2002) proposes a useful rule-of-thumb: "… if the commercial risk on a project is so high that government needs to underwrite or support private sector partners to ensure the [project] proceeds, the underwriting undermines the objectives of private sector participation by removing the private sector risk."

Kain also notes that the instances where demand risk can be viably incorporated into a project usually require a well-established track record of revenue or a substantial subsidy or ancillary revenue source.

There are various examples where countries have sought out means of sharing demand risk between the public and private partners in PPP projects, to varying degrees.

The Annex discusses Hungarian and Mexican motorway PPPs that involved the complete transfer of demand risk to the private partner, and resulted in subsequent costly renegotiations.

It also notes the example of Sweden's Arlanda Express, where the contractor bears demand risk, although part of the project debt is guaranteed by the government. The reduction in air travel as a result of the September 2001 terrorist attacks in the US and other external events impacted heavily on the financial situation of that project, although not to a point where the project failed (Nilsson *et al.*, 2007).

The Annex further shows that the payment mechanism for PPPs let by Austria's publicly owned motorway company will be subject to payments of approximately 70% based on availability, and 30% based on a shadow toll, reflecting demand risk.

France and Spain have experience in guaranteeing "economic balance" in motorway concessions, based on the project's internal rate of return (IRR). In these instances, exact measures are negotiated if the IRR turns out to be above or below what is expected, presumably with a view to preventing the concessionaires from building this into their calculations (Vassallo, 2006).

Box 6.1 provides an example whereby the Spanish government gives support to projects that are deemed to be of social value, in the form of loans with very low interest rates, but also increases those rates in instances where traffic levels are higher than expected. Box 6.2 provides another example where "traffic bands" were used in DBFO motorway projects under the UK's PFI in order to split risk in shadow toll contracts; essentially this means that the private partner is paid at different rates for different levels of traffic. The Annex describes the use of traffic bands in Portugal. In contrast, Chile, Colombia and Korea guarantee either traffic or revenues. These guarantees are also based on traffic bands, so that this risk is shared between the public and private partners (Vassallo, 2006).

Chile employs a number of innovative mechanisms for sharing demand risk, which generally involve either guaranteeing a certain revenue stream or conditioning the term of the project on the revenues received. These are described in Box 6.3.

Box 6.1. Spain's subordinated public participation loans (SPPLs)

Vassallo and Sánchez-Soliño (2006) describe the SPPL mechanism employed in motorway PPP arrangements in Spain. These low-interest loans allow the government to provide reimbursable support to private companies in concession projects that are deemed to be of social value, but which might otherwise not be commercially viable. They also allow for demand risk to be transferred to the private partner, while both moderating the extent of that transfer and limiting the possibility of windfall profits.

In particular, the private partner's demand risk is reduced by the fact that these loans involve very low interest, and are subordinated to commercial debt. Thus, if projections for traffic growth do not materialise, the loans could effectively become a subsidy. At the same time, the interest rate rises along with traffic levels, meaning that the private partner cannot benefit from cheap public loans to reap enormous profits. Rather, higher levels of traffic would benefit both the public lender and private borrower, meaning that each has a stake in the project's success.

The characteristics of SPPLs are defined by the government at the outset of the bidding process. Usually, a concessionaire is not allowed to ask for an SPPL of greater than 50% of the predicted investment cost. The term of the loan is generally equal to that of the underlying concession, and the principal is paid back during the last years of the contract. The interest on an SPPL is paid by the concessionaire on a yearly basis. The annual rate depends on the level of traffic, calculated as follows, with reference to Figure 6.2:

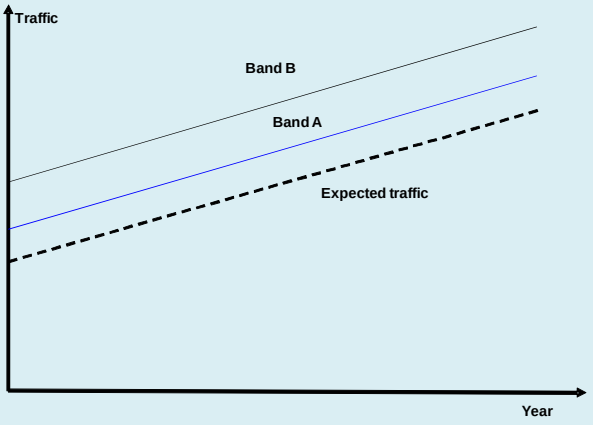
- If the traffic in year i is higher than expected but lower than the bottom limit of band A, the interest rate is 1.75%.
- If the traffic in year i is higher than the baseline prediction but within band A, the interest rate will be higher. It will, more specifically, be equal to the largest of the SPPL principal

times 1.75%, or 35% of the "extra" revenues obtained over the minimum prediction.

- If the traffic in year i is in band B, the interest rate will be equal to the larger of either the debt principal times 1.75%, or 35% of the extra revenues over the minimum prediction plus 15% of the extra revenues over the bottom limit of band B. This means that, above band B, the concessionaire will pay back 50% of the extra revenues obtained.

Traffic band A is defined to be between 1+x and 1+y times the traffic projection, and band B to be more than 1+y. x and y are usually set around 0.1 and 0.25 respectively.

Figure 6.2. **Traffic band structure in subordinated public participation loans**



Unlike subsidies, SPPLs are, for accounting purposes, defined as a financial investment. Thus, as long as financial investments are made on market-based conditions, SPPLs do not affect the government's budget deficit.

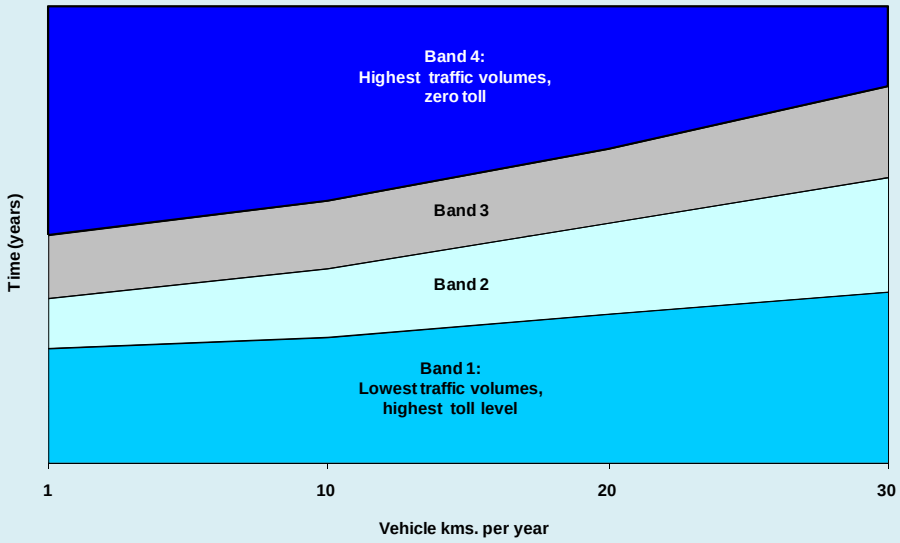
Box 6.2. Traffic Bands Employed in DBFO Projects Under the UK's PFI

DBFO motorway projects originally built under the UK's PFI limited the transfer of demand risk to private partners by way of a system of shadow tolls paid according to bands representing different traffic levels. Essentially, toll levels were designed to drop as traffic levels increased, although investors were assured by the fact that tolls collected at different band levels were specifically allotted to pay back different types of debt.

This is shown in Figure 6.3. Typically, Band 1 was used to service senior debt and fixed operating and maintenance costs. The second band normally covered subordinated debt service and variable operating and maintenance costs, and Band 3 served to pay dividends and equity debt service. Band 4 paid no tolls, thereby limiting the public partner's liability and capping the private partner's potential returns.

This model means that the private partner faces little concern about being able to meet debt service requirements if traffic volumes are low; its primary demand risk concern is that volumes might be too high, and thus not render any additional revenues. Moreover, the shadow toll concept means that the private partner bears no responsibility for toll collection (Alfen and Leupold, 2006a).

Figure 6.3. **Shadow toll bands in the UK PFI**



Source: *Alfen and Leupold, 2006a.*

However, preliminary analyses of shadow toll projects have indicated that this model limits the principal's flexibility and control, including with regard to the long-term commitment of public funds to a given project. As a result, this model is no longer widely used for new projects in the UK (Mackie and Smith, 2007).

Box 6.3. Mechanisms to Mitigate Traffic Risk in Chilean Concessions

Vassallo (2006) describes the following approaches employed by Chile to mitigate demand risk within its PPP programme, which has involved 26 motorway concessions since 1992. For most of these projects, concessionaires are expected to recover their costs through tolls, possibly with some subsidy to limit debt service costs. Chilean BOT motorways typically do not have competing parallel routes.

The *Minimum Income Guarantee* (MIG): All bidders are guaranteed income equal to 70% of the investment costs plus total maintenance and operations costs, and accept an obligation to share part of revenues obtained if traffic is higher than expected. In this way, traffic risk is shared and high losses and windfall gains are avoided; furthermore, debt-holders are reassured by the revenue guarantees, leading to lower financing costs. The main disadvantage resides in the possibility that various projects might fail at once.

This mechanism has generally performed well; from 1995 to 2003, 22 motorway concessions used the MIG, only two of which performed below the bottom traffic band. The government has therefore only had to pay out an extra USD 5 million to cover revenue shortfalls from investments worth close to USD 5 billion. When the Chilean economy experienced a recession in 1998-2002, the effect on traffic was felt more by concessionaires' shareholders than lenders, because of the revenue guarantees afforded by the MIGs. Furthermore, when shareholders argued for a change in contract terms, the government was able to reject this partly based on the argument that traffic risk was capped by the MIG.

Least Present Value of the Revenues (LPVR): This type of concession is awarded to the bidder submitting the bid generating the lowest present value of accumulated revenues. The bid should thus represent the revenue that the bidder needs in order to recover operating costs, service debt and give a return on equity. The present value calculation is based on a discount rate established by the government, and the concession ends when that value is reached.

The LPVR model involves no commitment of public resources, does not allow for tariff increases, and establishes a clear buy-out price. The LPVR has, however, only been successfully used on two projects. In two other cases where it was attempted too few bids were submitted, and those that were submitted either did not offer a required guarantee bond or requested a subsidy.

Revenue Distribution Mechanism (RDM): Under RDMs, the concessionaire is guaranteed a pre-fixed amount of revenues, at present value. Once that amount of revenues is reached, the concession ends. The present value could be based on calculations of 4, 4.5 or 5% growth. In exchange, the government requires initial investments, based on the calculation of the difference between the guarantee and the present value of expected revenues, meaning that higher guarantees require higher levels of investment. Unlike the LPVR, the RDM involves a revenue guarantee that limits the extent of risk transferred to the private partner. This type of mechanism was introduced in response to renegotiations due to economic recession and the need for additional investments.

Vassallo points to three primary lessons from the Chilean experience:

1. Mechanisms to share traffic risk between the partners have been demonstrated to work successfully.

2. Mechanisms such as the MIG did not reduce pressure for renegotiation when the economic conditions underlying the project changed substantially. Such renegotiations were, however, undertaken in a more orderly fashion than in other countries experiencing similar problems.

3. Concessionaires reacted particularly positively when downside revenue risk was limited by way of the RDM.

6.5 Renegotiation and Cost Overruns

6.5.1. Making risk "stick"

Governments are responsible for the creation of any given model for infrastructure provision. If a project fails entirely – such as if a private infrastructure manager goes bankrupt – the state is typically expected to step in and take over the responsibility for the road or railway in question. Furthermore, private partners often seek to limit their risk exposure by way of stand-alone SPVs, or third-party debt financing (Vining and Boardman, 2006).

These points indicate that users and taxpayers can potentially bear more risk than would initially appear from the agreements and regulations governing a PPP (Ehrhardt and Irwin, 2004). In turn, this raises the challenge of making risk "stick" to the private partner.

An obvious, up-front issue is that risk must genuinely be transferred. This may not be the case where governments guarantee public debt, as the result is that the consequences of failure are reduced.

The focus in creating PPP arrangements has often been on providing efficiency incentives by transferring as much risk as possible to the private sector. However, if we believe that governments will continue to intervene to stop private infrastructure providers from going bankrupt, then the amount of risk that effectively is transferred is more limited. It may therefore be better to recognise this by designing risk-allocation arrangements that limit risk transfer to "realistic" levels (Virtuosity Consulting, 2005).

One means for making risk stick is to include provisions in the contract that establish the precise implications of non-compliance by the private partner. For example, the UK National Accounting Office has reported favourably on a number of newer features of PPP contracts relating to the allocation of risks between the Highways Agency and other parties to the contract, including:

- Specific clauses built into each contract to prevent operators from handing back roads in a poor condition and to ensure that the net present value of cash flow remains unaltered should changes be required that would lead to the adjustment of toll levels.

- A system of penalty points so that, if contract performance falls below what has been specified, banks could step in and replace the contractor, subject to the approval of the Highways Agency. Failure to appoint a satisfactory replacement could lead to the Highways Agency terminating the contract.

- Provisions that allow banks to take operational control and appoint a replacement contractor should the private sector default on its loans for whatever reason, subject to the approval of the Highways Agency (Edwards *et al.*, 2004).

6.5.2. Contract "completeness"

Since PPP contracts extend over a large number of years, it is highly likely that changes will occur at some point of time, which may have cost consequences to varying degrees. Demand for using certain routes may change, for instance due to unforeseen changes in the local economy and/or due to patterns of population migration. Other changes could be related to government policy objectives, such as with regard to the extent to which infrastructure pricing should be employed for the purpose of demand management and limiting environmental impacts. Furthermore, the private partner's financing conditions, for instance with respect to interest or exchange rates, may change.

One consequence of such changes is that one or both parties may want to renegotiate the initial contract. Estache and Serebrinsky (2004) cite analysis by Guasch (2004) showing that, of all transport concessions implemented in Latin America between 1985 and 2000, almost 55% were subject to renegotiation, on average about 3 years after the awarding of the contract. They also note that not all renegotiations were considered negative; one welfare-enhancing aspect was related to accounting for features that had not been included in the original contract. As seen in the Argentine example in the Annex, renegotiations can also be highly costly.

To understand the nature of the contracts that are signed, it is useful to make a distinction between "complete" and "incomplete" contracts. The complete contract regulates, in detail, the parties' obligations in each possible future situation. For instance, if maintenance costs grow faster than expected, the complete contract sets out which party has to handle the consequences of this, and the same goes for the consequences of changes in demand, interest rates or other financial parameters. With complete contracts, theoretically, conflicts never have to surface since it is absolutely obvious what a court would say if a conflict emerges. The power of the parties after the contract has been signed is of no importance, since any violation of the contractual terms would result in penalties.

However, complete contracts are impossible – or at least very difficult – to design and implement, given the complexity of PPP arrangements. Instead, the principal typically signs an incomplete contract with the agent, specifying the provision of services only to a partial extent. When events not controlled for in the contract arise, they have to be settled by the parties. Many construction contracts are sorted out in court since the parties are unable to settle who is responsible for the consequences of an unpredicted event after it has happened.

It is important to emphasize that renegotiating a contract after important changes to its prerequisites have taken place is reasonable. In many situations, both parties may realise that this is necessary and can find a division of costs and benefits that they find mutually beneficial. This is also a core component of the PPP concept, in particular with respect to the partnership aspect of the acronym.

6.5.3. Outsourcing financing as a means of strengthening commitment

The presence of contract incompleteness can be used by either party to further its own interests at the cost of the other. If a project fails, the financial and political consequences can be dire. The principal will therefore attempt to prevent project bankruptcy, perhaps by an unscheduled price increase, or government injection of money into the firm. Knowledge of this provides the agent with considerable leverage in its negotiations with government, and may also lead it to submit an initial bid that intentionally underestimates later costs.

As one example, when building a new road it is possible to spend extra money to make it thick, thereby reducing later maintenance costs; alternatively, the contractor could save on construction costs, assuming that it will pay more for future maintenance. However, a participant in a tendering process could also submit a bid for a long contract based on the cheaper, thin-road construction, but calculate future maintenance costs as if a thick construction had been chosen. This would depress the present value of its bid and increase the chances for winning. Of course, the higher maintenance costs would eventually emerge, and the payment regulated by the contract would then be insufficient to cover costs; thus, the contractor would likely seek renegotiation in order to boost the payment. The principal could refuse this, but if this were to result in the bidder's company – which could be a special purpose vehicle with limited risk capital – going bankrupt, the government principal would be stuck with taking responsibility for a road built in an inappropriate way. Realising this, the principal may agree to pay more to the agent than stipulated by the original contract, thus rewarding the contractor for submitting a bid in bad faith.

One way to reduce the risk of renegotiation in bad faith is to ask the contractor to provide financing for the project. To understand this, consider a PPP contract in which the builder is not reimbursed for the initial construction costs immediately after having made the new road or railway available for traffic. Because the contractor, as part of the arrangement, has had to raise risk capital and borrow on the open market to have the project built, the relative strength of the parties upon renegotiation will change. With the construction company also financing the deal, the loans will be paid back during the lifetime of the contact. Thus, in the same situation as before – *i.e.* an ill-faith bid and growing maintenance costs – the contractor would still sit with debt that remains to be repaid. Parts of this debt would presumably include the profit to be made on the construction project. This reduces the contractor's negotiating power to have the payment for maintenance costs increased. Thus, the chance that the original bid will be based on a more realistic estimate of the lowest possible construction and maintenance costs presumably increases.

This is a crucial justification for delegating financing. By risking equity money and bank loans, prudence in bid estimation is enhanced and the contractor is given incentives to be more careful in

assessing more or less optimistic scenarios for future costs and revenue. In addition, private investors are assumed to be more sceptical about supporting financially unsustainable projects, and will have a stronger incentive than government to monitor the ongoing viability of their investments.

The downside to this is that the agent must now arrange for at least part of the project financing by way of external debt. The commercial agent is a larger risk for banks than the government would be, indicating that the costs for taking up the loan will be higher for the agent than they would be for the principal. A well-designed project would, however, have a certain income stream with annual payments from the principal to the agent specified in a contract, which can be used as collateral. This may reduce the gap between the interest rates paid by a private and a public borrower.

It has also been argued that the higher cost of private debt is less relevant from a social perspective, because the difference between the interest rates charged to the private and public sectors only reflects the fact that governments enjoy a credit insurance mechanism – namely the right to tax – free of charge. In other words, the costs of overruns in construction costs and time delays in fully public projects are absorbed by taxpayers and users with no compensation, while this – theoretically – in not the case when the project is in private hands (Blanc-Brude *et al.*, 2006).

An additional benefit of private financing is that banks become interested in the details of how a project is operated. The risk premium in banks' lending rates should, therefore, at least partially be balanced against the extra scrutiny that external lenders provide to the project. Similarly, it is also important to emphasize that any public loan guarantees will reduce the effectiveness of private financing as a tool for enhancing commitment.

Chapter 3 established that there is no clear economic argument for using off-budget arrangements – such as PPPs – as a financing mechanism. The above discussion establishes that there might be strong logic in using private finance for another motive, *i.e.* as a means for better ensuring efficiency by making the contractor more committed to the arrangement. But Chapter 3 also provided an additional important caveat to this argument, in that an off-budget arrangement will not result in any budget costs during the construction period but often does commit the government to a stream of future annual payments. This means that the preparation of an off-budget PPP contract should include a long-term perspective on overall budgeting, so as to avoid later affordability problems.

6.6. Summary

Risk transfer is a defining element of PPP projects, and plays a key role in determining the extent to which efficiency gains may be achieved. This chapter has provided an overview of some of the principles that must be kept in mind when assigning risk in such arrangements. In particular, the risks of each project must be carefully assessed on a case-by-case basis, and the project meticulously designed, including its contract and the means of financing and compensation.

KEY CONCLUSIONS

- The transfer of risk to a private partner in a PPP arrangement typically requires some degree of compensation. In many cases, the cost of transferring risk will outweigh the benefits.
- In principle, risk should be assigned to the actor most capable managing it. Some risks may be impossible for non-public entities to manage, and should therefore not be transferred.
- However, the exact division of risk cannot be simply generalised. The circumstances surrounding each project and the respective capacities of the partners will determine the exact division of risks.
- Demand risk is particularly complex, and its transfer must be subject to close consideration.
- The scope of the contract and type of remuneration are essential to establishing the division of risk. The complexity of PPPs does not lend itself to absolute fixed-price contracts. Thus, governments should seek to approximate such contract terms to the extent possible, leaving out those risk elements that private partners are not able to manage. In general:
  - Where cost uncertainty is smaller, more risk should be assigned to the agent.
  - The higher the value of the contract, the greater the risk that should be assigned to the agent, as there will be more opportunity for cost savings via risk transfer.
  - The greater the agent's ability to bear risk, the more risk should be assigned to it.
- There should be strong incentives to ensure that the infrastructure is returned to the principal in reasonable condition.
- A major concern resides in the extent to which risk can be made to "stick" to non-government partners, especially given the political costs associated with the bankruptcy of an infrastructure provider. This concern must be recognised up front in the design of the infrastructure model, including in the contractual arrangements with non-government partners.
- One means of increasing private partners' commitment in PPP arrangements is by transferring the responsibility for financing the project in question.

7. EFFICIENT CHARGING OF INFRASTRUCTURE USE – SHOULD INFRASTRUCTURE BE PAID FOR BY TAXES OR CHARGES?

7.1. Introduction

Previous chapters have addressed the potential efficiency benefits from outsourcing the production of surface transport infrastructure by contracting with commercial enterprises, and from devolving control over infrastructure provision to entities that are independent of government to a greater or lesser extent.

The current chapter focuses on the efficiency properties of a key issue that is exogenous to most of the models, but which will have an important impact on the extent to which those models are able to deliver efficiency gains, namely the pricing of inland transport infrastructure, irrespective of whether facilities are outsourced, devolved or under direct government control.

Section 7.2 will revisit the discussion of marginal cost pricing, and 7.3 considers the practical application of this principle. Section 7.4 then takes this discussion a step further by analysing the consequences of these overall principles for single projects. Section 7.5 reviews the arguments for and against the earmarking of tax revenue. Section 7.6 concludes.

7.2. Marginal cost pricing – Overall principles

Market economies function based on prices that signal scarcity. Price variations mean that commercial companies will sometimes make a profit, sometimes operate at a loss, and sometimes just break even. Economics textbooks show that the best way for firms to maximise their profits is to charge according to marginal costs for producing goods and services; this means that a customer is charged for the extra costs that he or she gives rise to by way of consuming a commodity. The purpose here is to pinpoint some overall implications of this pricing principle where surface transport infrastructure is concerned, including the consequences of marginal cost pricing for cost recovery (for an extensive discussion of this issue, see ECMT 2003 and 2004; Mackie and Smith, 2005a).

Infrastructure pricing is important since the price charged affects the extent to which an asset is used: The higher the price, the fewer users will appear. A key question, therefore, is *how* available infrastructure assets should be priced in order to promote efficiency.

In the same way as for other commodities, the basic theoretical recommendation is that existing resources should be charged according to the marginal social costs of using them. This means that the price charged for using infrastructure should be equal to the costs imposed by the use of that infrastructure, including externalities.

When users pay a price equal to marginal costs, they are provided with the appropriate incentives regarding whether and how to undertake travel. If the benefit of undertaking a trip or sending off a freight consignment exceeds the costs, including the price for using infrastructure, that trip or that transport will be undertaken. If the costs are higher than the benefits, the trip or transport will not be

undertaken. The price, therefore, when the full costs are included, functions as a rationing mechanism for transport use.

The "externality" part of the concept refers to social costs that are not automatically charged if only wear and tear and congestion are considered. Such costs may occur because of accident risks; the more vehicles there are in the system, the larger the number of traffic accidents may be. In the same way, additional traffic inflicts environmental damage, including the emission of pollutants and noise generation. By including estimates of how large these costs are as part of the pricing scheme, they are said to be *internalised* by the user.

Marginal social cost pricing is an essential theoretical construct where the pursuit of efficiency is concerned. It has been accepted as a fundamental policy principle by the European Conference of Ministers of Transport (see ECMT 2003 and 2004).

7.3. Practical application

Marginal cost pricing in the economy at large means that companies, on average and in the long run, will break even. Application of marginal cost pricing principles for infrastructure use does, however, not automatically imply cost recovery. The reason is that the huge costs that historically have been spent on building infrastructure are not affected by the use of the existing infrastructure and are therefore *not* part of a charging scheme. Charging for congestion may, on the other hand, generate revenue towards the payment of at least some of these historical investment costs. This, in turn, means that the application of the marginal cost pricing paradigm may generate different financial results in different situations; sometimes revenues will be more than sufficient to pay for costs while, in other instances, they may be (much) lower than costs. Marginal cost pricing of infrastructure will, however, only under very special circumstances automatically guarantee full cost recovery.

The same principles apply to all commercial production. If demand is low relative to capacity, prices are typically adjusted downwards, towards marginal costs. Conversely, in periods of short capacity, firms may make profits by raising the price well above break-even levels. Several types of goods and, in particular, services demonstrate this type of price variations over time. Airline tickets and visits to holiday resorts may be charged prices that are several hundred percent higher in some periods (with high demand) than in others (off season). It should be emphasized that most commercial enterprises pursue these policies without reference to – or even knowledge of – the concept of "marginal cost". However, the rationale behind this behaviour can still be characterised using the basic marginal cost pricing paradigm.

Road and railway infrastructure displays similar cost and demand structures. The bottom line is that the extra costs imposed by allowing a single additional user on a road or railway are normally very small, because the marginal wear and tear is low. There are, however, situations where demand is high relative to capacity. Peak hour traffic in cities and on major inter-city arteries may generate traffic jams, which signal short capacity and a need for higher prices to ration access appropriately. Congestion charges are, in such cases, part of the marginal cost pricing principle. If so, charges function both as an effective demand management tool, and as a means of generating revenue that can be used to expand system capacity.

On top of the production cost of fuel, most countries levy a tax. For the road sector, these surcharges can be seen as a payment for using the system, equivalent to the purchase of an airline ticket where air travel is concerned. However, an important difference between fuel taxes and the commercial type of pricing seen in aviation is that the former is a blunt instrument, in that it does not display variations over time and geography to reflect scarcity and additional costs.

For various reasons, the practical application of the marginal cost pricing principle to surface transport infrastructure remains difficult:

- Exact measurement of the full costs of transport use, including of externalities, is complex.
- Costs may vary considerably across large road and railway networks, and among vehicles, in particular with respect to axle weight. As of today, charging systems do not allow for decentralised pricing of these costs across the transport system; technical development in this field is, however, progressing.
- As already indicated, marginal cost pricing in its most basic version may mean that revenue (e.g. from fuel charges) is not sufficient to make up for costs (i.e. for infrastructure construction and maintenance), meaning that it will not be enough to provide an adequate supply of infrastructure.

These statements are not without controversy. Indeed, Gómez-Ibáñez (1999) argues that the impediments to employing marginal cost pricing in transport and the sector's inability to match full costs with revenues are often exaggerated by interested parties hoping to justify subsidies. In many instances, cost recovery problems may result from resolvable technical and political problems with differentiating charges across time, between different parts of networks, and among different types (heavy and light) of vehicles, rather than from more fundamental impediments.

Box 7.1. Elasticity and Ramsey pricing

The consumption of any commodity is affected by its price – the higher the price, the less consumers will buy. The elasticity concept is a mathematical way to measure *how much* demand changes when the price of a commodity varies.

To understand this, let q_i be the quantity consumed of commodity i and p_i be the commodity's price. Elasticity ε_i is then defined in the following way (where d denotes the change that takes place):

$$\varepsilon_i = \frac{\textit{percentage change of quantity}}{\textit{percentage change of price}} = \frac{\frac{dq_i}{q_i} * 100}{\frac{dp_i}{p_i} * 100} = \frac{dq_i}{dp_i} * \frac{p_i}{q_i}$$

Different commodities have different elasticities. The more responsive the demand for a commodity to price variations is, the more elastic it is said to be. In this, it should be noted that a *higher* price means that demand is *lower*, meaning that the elasticity is often defined by adding a minus before the expression.

Elasticity varies for a number of reasons. In the transport context, one important cause is the presence of alternatives. The better substitutes there are, the greater the reaction of a certain commodity to price change will be, as it is thus easy to switch over to an alternative commodity.

Using this definition, researchers have long-since agreed that taxation for revenue generation purposes – which differs from taxes to internalise external costs – should differ depending on elasticity. What is often referred to as Ramsey pricing means that the *lower* the elasticity, the *higher* taxes should be on that commodity. The rationale is that tax rates that differ across commodities will distort consumption less than if the same tax rate is applied for all commodities.

These issues also raise more general questions regarding public budgets. In most societies there is heavy competition for tax revenue for a multitude of purposes. A core task of any finance ministry is to raise this revenue in a way that minimises the distortion of efficient resource use. Distortive taxation will otherwise block the country's growth potential.

Box 7.2. Experiments with Flexible Tolling in Japan

In Japan, the standard toll rates on expressways in 2005 were JPY 150 plus JPY 24.6 per kilometre for passenger cars, and roughly double for large vehicles. However, road users are observed to avoid travelling on toll roads where possible, leading to congestion, safety and environmental problems on non-tolled routes. Thus, a flexible charging scheme is increasingly seen as necessary for managing road transport demand.

In 2002, the Japanese Council for Infrastructure asked the government to introduce more flexible tolling on roads. As a result, since 2003, the Road Bureau of the Ministry of Land, Infrastructure and Transport (MLIT) has undertaken a demonstration project on flexible tolling, whereby tolls are temporally set lower for specific times, vehicle types, and/or segments of networks. This experiment aims to co-ordinate the traffic volume between toll roads and parallel non-tolled roads. It has been established that flexible tolls can be a useful measure to manage road transport, although this policy might conflict with the objective of maximising revenues with a view to covering infrastructure construction and operations costs.

A key element in the success of this experiment relates to price elasticity as a function of traffic volume. The elasticity for many of the routes studied was roughly between 0.4 and 1.0 on roads with more than 1 000 vehicles per day, meaning that the reduction in tolls resulted in a reduction in revenues (see Matsuda *et al.*, 2005).

However, on the same routes there are times where the elasticity may exceed unity. In an experiment in Aganogawa City in 2003, a 50% toll discount caused large increases in traffic volume, especially on holidays. The average traffic volume during the experiment was 173% compared to before, and 195% on Saturdays, Sundays and national holidays. As a result, the length of queues on non-tolled roads decreased by almost half of the original length. This suggests that cost-based tolling may previously have undermined the benefits to users of the road network. Lowering toll rates can therefore improve welfare for transport users, as well as lead to increased traffic that will recover significant portions of lost revenue.

Even where price elasticity is not that high, there is a case to say that flexible tolling may provide benefits compared to cost-based pricing for road operators. In an experiment in Hitachi City, a toll discount of approximately 50% resulted in traffic volumes of about 170% on weekdays. While the resulting loss of revenue was about JPY 600 000 per day, the value of travel hour loss from congestion, including on non-tolled routes, decreased by JPY 15 million per day.

The benefit of discounting on tolled roads is not limited to road users. An improvement of the living environment due to the experiment was reported from the Hamana Bypass experiment, which involved the extension of a non-tolled period to morning and evening peak hours (6-9 AM and 8-9 PM) when, traditionally, many commuters used non-tolled national highways while the tolled bypasses had been relatively uncongested. The experiment yielded increased traffic volume on the Hamana Bypass of 60% (3 500 vehicles per day), and decreased traffic volumes on the parallel non–tolled national highway of 30% (1 800 vehicles per day) during the newly introduced free periods. Notably, the areas near the non-tolled highways, which are more densely populated, experienced a drop in noise levels to below the maximum levels called for in environmental standards, and it would be reasonable to expect improvements with regard to air pollution due to particle matters and nitrogen oxide (see Matsuda *et al.*, 2005).

With these points in mind, if we accept (a) that marginal cost pricing may often not provide for the full costs of surface transport infrastructure, especially in some sectors (*i.e.* passenger rail); and (b) that most governments' financing practices in the sector do not tend to directly link revenues to costs, this leaves governments with the need to subsidise infrastructure in the least distorting way possible.

The conventional wisdom among scholars, as well as many finance ministries, is that this can be achieved by way of Ramsey pricing. The recommendation from this line of analysis is to tax consumption more when it is less responsive to price variations, as opposed to commodities that people will buy much less of due to higher prices (see Box 7.1). This will minimise the distortions of taxation.

In particular, road use is considered to be relatively insensitive to price increases. The Ramsey rule thus indicates that efficiency-seeking governments should not hesitate to tax road use higher than other commodities. This may then provide the efficiency logic behind the observation in Chapter 2 that governments often derive more revenues from the roads sector than they spend on roads.

In reality, the optimal use of pricing in terms of its social impact may be one in which tolling is applied differently at different times or on different parts of the network. This is because both costs and demand elasticity can vary on different parts of the same network or at different times of day. An example of considerations of this nature is provided in Box 7.2.

Furthermore, transport networks can be financially self-sustaining based entirely on user charges, and can be financed through the private market. The rail freight system in North America is operated in that manner, as are ports and airports all over the world. To the extent that this is based on a well-functioning market for transport infrastructure services, it can be assumed that this involves close approximation of the marginal cost model. However, it has already been noted in Chapter 5 that this model is not widely applicable where much surface transport is concerned.

As a general conclusion, governments should seek to approximate, to the extent possible, marginal social cost pricing, while subsidising additional transport needs as required in the least distorting way possible. As Mackie and Smith (2005a) note: "… principles will only take you so far – the correct solution is likely to be context specific, depending upon network characteristics, levels of demand and congestion, social acceptability of tolls, which depend partly on country tradition, and policy choices between integrated highway networks controlled by public authorities versus mixed public and private systems."

7.4. Marginal cost pricing from the single project perspective

The choice between user charges and taxation to pay for individual projects is often based on practical considerations of traffic expectations, as well as on users' perceived willingness to pay and other political concerns. This may, for instance, go a long way in explaining why most user-funded PPPs focus on major motorways, while the rest of the system tends to be publicly subsidised.

The discussion in Sections 7.2 and 7.3 concerning the principles for charging on road networks has some specific messages for the efficient pricing and financing of single projects. It is, more precisely, feasible to sort out the arguments for and against the use of user charging to pay for a new piece of road or a part of the railway network, versus using tax revenue as the source of financing.

A new road typically has much capacity relative to traffic over the first years of use. The marginal cost for using the facility is then low and basically refers to some extra wear and tear inflicted by vehicles using the road. The baseline recommendation is therefore that this infrastructure should not be tolled (see Kopp, 2006).

However, this would mean that new projects would have to be paid for by way of tax revenue. In turn, taxes must then be raised slightly – or not lowered – in order to pay for the new infrastructure. But taxation consequently reduces the consumption of other commodities. This is a distortion since the tax does not reflect a real cost – welfare is thus reduced.

The size of this distortion is often referred to as a dead weight loss, being the consumer and producer surplus that will not be realised as a consequence of the tax. An extensive literature has sought to estimate the size of this cost. Of course, it differs across countries and may vary for different types of taxes (on wealth, on income or consumption, for instance).

In Sweden, it has been estimated to be around 30% at the margin. This number is used in infrastructure planning to signal the social cost of raising revenue for investment and maintenance purposes. It means that the cost-benefit analyses that seek to estimate the social value of road and railway projects automatically assume that any budgetary consequences of a project cost are 30% more than the nominal cost; a SEK 100 million project will therefore cost SEK 130 million in social terms.

This also means that there is some scope for accepting tolls, even if they distort infrastructure use. If, more precisely, the social costs from toll funding are not higher than the social costs of tax funding, there is reason to also consider levying a toll on a non-congested road or having a higher user fee on a railway.

This argument can be taken a step further. Some roads are fairly unique in that they have very poor alternatives, while others are just a link in a tightly-knit network. It is obvious that a toll on the unique road will deter users much less than the same toll levied on roads that are parts of a network. This provides logic for levying tolls on estuary crossings and bridges, such as the Öresund Bridge between Sweden and Denmark. The appendix has an example from Hungary of a toll which had negative consequences for the number of vehicles on a new motorway (*i.e.* too few) and on other local roads (*i.e.* too many), as users chose alternative routes, showing the possible consequences of selective tolling in dense networks.

The above principles also imply that there is possibly a difference between optimal policies in more or less developed countries in this respect. In developing countries, the demand for tax revenue is typically very high. Health service, schools and other social services are often at a poor standard and require much funding. As a consequence, governments may prefer to delay investments in roads or railways, even if they have a high rate of return in terms of the cost-benefit analysis. A toll may, therefore, be the only way to have projects built, even if the toll means that the facilities will be used far below capacity. It is, in other words, better to have a new, tolled road with excess capacity than no road at all.

An additional point relates to the extent to which price setting is delegated to an independent partner, which is a feature in some PPP and devolution arrangements. Clearly, private companies cannot be expected to conscientiously set prices with a view to meeting public policy objectives, such as achieving efficiency by way of marginal cost pricing. Furthermore, most land transport infrastructure is not provided under perfect market conditions – the inelasticity of demand for road transport has already been underscored. On the other hand, where alternative infrastructure provision arrangements leave pricing levels in government hands – which is largely the norm – the public sector must accept *a priori* that commercially oriented partners will require an adequate return on investment, and that this may require a subsidy to make up the difference between costs and pricing levels (which might be set based on marginal cost principles, or simply on political considerations).

Mackie and Smith (2005a) studied the potential impact of PPP arrangements in the pursuit of efficient pricing policies, and concluded that the choices faced by governments are not reduced to full marginal cost pricing versus commercial pricing. Rather, many options exist for compromise, essentially resulting in a regulated toll structure. In other words, options exist for intervention to ensure consistency between policy provisions and the model for providing infrastructure. Specifically, they highlight the option of tolling based on social efficiency principles, with public funding employed to bridge any gap between resulting revenues and costs. However, they also note that such regulation requires a willingness and capacity on the part of government to actively engage in overseeing the functioning of the model throughout its lifespan. In other words, the creation of alternative models for the provision of infrastructure does not end government's role in the task, but rather transforms it.

7.5. Earmarking

It was already noted in Chapter 2 that parts of the surface transport infrastructure system – notably roads – often account for more government revenues than expenditures. This infers that, at least in those areas, a lack of funding is not necessarily the problem where infrastructure is concerned, but rather a lack of prioritisation. Of course, even that statement cannot be entirely confirmed if no comparison has been made between revenues and full costs – including externalities – in a given sector.

In any event, the "traditional model" for public sector spending and investment supposes that tax revenue is raised based on certain standards, and that the revenues are employed based on other standards. We have, more specifically, asserted that taxes raised for revenue generation purposes should be set so as to minimise their distortive consequences. Notably, this contrasts with taxes levied in order to internalise external costs, where the level of taxes should be set so that consumers face the full economic cost of buying goods and services.

In the traditional model, revenues from all types of taxes are usually collected in a common pool. Decisions are taken – typically during the annual budget process – to allocate resources from these consolidated receipts for all different types of uses, including transport infrastructure investment and maintenance. In principle, the government should apply money to different uses according to where they provide the highest benefits.

One implication of this standard model is that there is no automatic link between the amount of taxation in a certain sector of the economy and the resources sent back into that sector. The government is, moreover, assumed to act as an omniscient and benevolent welfare maximiser in its decisions about tax levels and allocations for different purposes.

In contrast, tax earmarking – or "hypothecation" – refers to the assigning of receipts either from a single tax base, or as a proportion from a wider pool of revenue, to a specific future use. There are at least two versions of earmarking (Wilkinson 1994):

1. Earmarking in a strong or substantive sense basically means that revenue determines expenditure. This may be based on referenda on the amount of spending and the tax rate in order to ascertain that this link is maintained. Alternatively, politicians may campaign on promises about future levels of taxes and spending.

2. Earmarking in the weak sense is a formal device that involves ensuring that all revenues from a given sector or activity are applied to that same sector or activity, with a view to making the system more transparent and informing the taxpayer of the cost of services. This corresponds to the earmarking of fuel tax revenues for road and other expenditures in the US (see the Annex) and in Japan.

The discussion about earmarking has its background in the Public Choice school of thought, dating back to the 1950s. The idea is that the state is not an independent choosing agent but exists only as a means through which individuals combine to collectively accomplish desired objectives. Market failure is not corrected at zero costs and should also be related to the risk for government failure that arises through the self-interested behaviour of politicians and bureaucrats. In this model world, the growth of the public sector is not a response to the demands of citizens, but a burden imposed by a powerful government bureaucracy. To restrain public spending, mechanisms to give more power to the citizen are necessary. The earmarking of taxes is one such mechanism.

In a sense, earmarking has an element of the *benefit approach* to equity in taxation, *i.e.* the idea that people should be paying according to the benefits they receive from consuming a commodity. However, paying in line with benefits received means that each consumer would pay differently, and this is in contrast with the standard definition of a tax.

Furthermore, in reality, the individual's ability to choose is unclear. Whereas the application of a user-fee principle may increase welfare by allowing individual consumers to choose their preferred quantity of publicly provided goods, this is not necessarily the case with earmarked taxation, since most publicly provided goods are non-excludable, unless we talk about toll roads. Even if an individual consumer knows that the proceeds from a fuel tax are used to finance roads, that person cannot choose the amount of roads he or she personally prefers to have built. Formal earmarked taxes are, therefore, not an application of a user-fee principle, where the individual consumer pays a price for some publicly provided good in the same way that he or she would for privately provided goods. A median voter is the only person for whom earmarking and the user fee principle are equal.

One argument is that only taxes that are transparent should be earmarked. Ultimately, all taxes are paid by individuals since most taxes levied on businesses in one way or another will mean that the price charged to consumers will be affected. However, some taxes are more transparent than others, making it more obvious who at the end of the day will pay the bill. For instance, the argument in favour of earmarking taxes, such as social security contributions levied on employees' income, may be weak, as such taxes are, to a substantial extent, shifted to employees by their effect on nominal wages. Earmarking of revenue from infrastructure use may, in this sense, be more transparent.

Another line of (orthodox) argument against earmarking is that public spending should be determined by policy decisions, not by the amount of revenue raised by an earmarked tax. Earmarking reduces the flexibility of the fiscal system; the yield of a tax and the revenue necessary for a service may coincide at the start of an earmarked system, but, over time, excess revenues may accumulate in some areas while there will be deficiencies elsewhere.

A corollary to the flexibility argument is that the possibility to use public sector spending as an instrument for counter-cyclical policies – if these are considered appropriate – will be diminished. In the standard-model world, a government that wants to stimulate the economy in a period of economic recession can do so with just one single decision to spend more on, for instance, road construction. Earmarking makes this more difficult, as it would make it necessary also to take a stand on what should happen on the revenue side.

Recent analysis challenging the role of government as a benevolent welfare maximiser – noting objectives other than welfare maximisation and asymmetric information – might provide a stronger argument in favour of earmarking. Bös (1999), for example, notes that government agencies responsible for taxing and spending enjoy private information that limits the effectiveness of parliamentary oversight. He suggests that earmarking could be made part of incentive contracts inducing these agencies to reveal their private information and thus augmenting efficiency.

To summarise, the earmarking of tax revenue has been seized on both by those who want to defend the public sector and think it would make taxation more palatable to the public, and by those who want to cut public spending who expect the opposite effect. A third road is taken by those who believe that – irrespective of outcomes – earmarking would make for informed choices and more democracy. Irrespective of political standing, the analytical argument in favour of earmarking is still inconclusive. New models are, however, being developed that may in future affect this debate.

7.6. Summary

A key point arising from this chapter is that the way in which infrastructure is priced will have an essential impact on the efficiency with which it is used. Thus, the question of pricing must be addressed up front as a fundamental element in the design of the model for the provision of surface transport infrastructure. However, for the most part, pricing is endogenous to the model – PPPs, state-owned companies, agencies and other models can all be designed using differing degrees of user charging.

It is generally accepted that marginal cost pricing would result in the most efficient use of inland transport infrastructure. Thus, governments should seek to approximate this, where possible.

The full application of marginal cost pricing is, however, technically and sometimes politically difficult. Furthermore, it may in some situations result in under-funding of given infrastructure. Finally, high tariffs may lead to under-utilisation of new infrastructure, especially where alternative routes exist. Where this last point is concerned, it is important to consider whether the overall distortions resulting from tolling would be smaller than those resulting from taxation. In addition, in developing countries, the rate of return on tax revenue may be greater in other sectors, meaning that distortive tolls may be better than having poor roads.

In general, the difference between the cost of infrastructure and revenues from marginal cost pricing should be made up in the least distorting way possible.

Finally, as of today, the argument in favour of earmarking tax revenues in given sectors is inconclusive, although this is a subject of ongoing research.

KEY CONCLUSIONS

- To the extent possible, tariffs for the use of inland transport infrastructure should seek to approximate marginal cost pricing.
- Where this does not fully provide for the funding of that infrastructure, or where it is deemed that tolling new infrastructure would hamper efficiency, governments should make up the difference by way of the least distortive taxation.
- There are no clear arguments in favour of earmarking all taxation from a given sector to pay for expenditures in that sector. Ongoing research may affect this discussion.
- The extent to which infrastructure funds lead to a more rational allocation of financing to infrastructure is largely based on their governance structures and the nature of financing sources.

PART IV: EFFECTIVE IMPLEMENTATION OF PUBLIC-PRIVATE PARTNERSHIPS

PPPs are one instrument by which governments can seek to increase efficiency in the provision of surface transport infrastructure. The potential advantages and disadvantages of such arrangements were discussed in the previous part. In many instances, PPPs will not be appropriate. Where they are, it is essential that they be appropriately designed in order to achieve efficiency gains over the life cycle of the project. This part deals with two key elements of PPP design: legal and regulatory frameworks in Chapter 8, and procurement processes in Chapter 9.

8. PUBLIC-PRIVATE PARTNERSHIPS LEGISLATION AND REGULATION

8.1. Introduction

This chapter discusses the overall legal and regulatory framework that typically must accompany the creation of public-private partnerships for the provision of surface transport infrastructure, with a view to protecting the public interest and providing private partners with a stable business environment.

Section 8.2 looks at the regulation of surface transport infrastructure in general, while 8.3 looks at PPPs in particular.

8.2. Legal and regulatory frameworks for the provision of surface transport infrastructure

The delegation of responsibilities related to the provision of surface transport infrastructure is often associated with economic deregulation in the transport sector. However, it would be wrong to perceive this as a process of removing all regulation. Indeed, in reality, the opposite may be true – outsourcing and devolution can result in a need for more rigorous regulation to manage the principal-agent relationship.

Chapter 1 noted that transport infrastructure comprises key public assets, provides a fundamental underpinning of the functioning of society and the economy, requires enormous investments, may be subject to limited competition in the market, and its use may generate important negative externalities. As a result, the functioning of transport infrastructure is perceived as a government responsibility, no matter what the model for financing and provision chosen. The provision and quality of land transport infrastructure thus cannot be left entirely to market forces, and must, to some extent, rely on legislation and regulation, varying depending on the model employed.

Where the government is directly responsible for infrastructure provision, it can regulate its own activities by way of internal government structures, including the need to report, ultimately, to the cabinet and parliament. Table 1.1 noted that, even where state ministries or agencies provide infrastructure, key elements of the overall organisation and management of the process should remain in the hands of other government entities, in order to ensure a balanced approach. For example, while a roads agency may provide motorways and decide where new investment should take place, other ministries would likely decide – collectively or individually – on such issues as, *inter alia*, the agency's budget; overall policy for expenditures; the extent of user charging and toll levels; and the environmental, safety, security, accessibility, and other public policy objectives that must be complied with.

Oversight of infrastructure may also be achieved by retaining partial or complete government ownership over an infrastructure-providing entity. In such instances, while a state-owned enterprise may provide infrastructure based on "commercial principles", it still remains ultimately responsible before elected officials, and thus, before the general public.

Furthermore, the creation of infrastructure-providing entities – including those that are state-owned – often requires enabling legislation, which can set the fundamental aspects of good governance that must be adhered to, including such elements as transparency and accountability. Such legislation can also establish operational requirements, including limits on borrowing, and requirements to show profits and provide dividends, which are intended to instil commercial operating principles.

It is, in particular, as governments delegate specific responsibilities related to the provision of surface transport infrastructure that there is an increasing need for legal and regulatory instruments to protect the public interest. This does not imply interventionist policy, but rather, ideally, the existence of a solid legal framework to prevent abuses of market power, ensure that public policy goals are met, and provide a stable operating environment.

For example, the most extreme form of the delegation of responsibilities – outright privatisation – requires legal instruments to create new entities and to allow for the transfer of public assets to them. This legitimises the process, inasmuch as the passage of these laws must be approved by politicians, representing the public. In addition, an effective regulatory framework is required, particularly where the privatised entity essentially represents a monopoly or quasi-monopoly. This requires striking a complex balance between representing the public interest and allowing companies to be profitable and competitive. In North America, where rail infrastructure and services have been fully privatised, governments have also created specific regulatory bodies responsible for ensuring the well functioning of the system, which oversee the implementation of specific elements of the legislation enabling the existence of the private rail companies, including with regard to such issues as tariffs and levels of service (see the Annex for an example).

Of course, the need to create new regulatory instruments means that the government must develop and retain the appropriate structures and competencies to oversee these. This adds to the overall cost of the infrastructure provision model itself.

8.3. Legal/Regulatory frameworks in public-private partnerships

Whatever their form, PPPs are inevitably a complex organisational and financial model, particularly keeping in mind the web of business dealings that might be involved between the primary contractor and sub-contractors, as seen in Figure 1.4. In their most developed form, PPPs cover the whole life cycle of a project, likely over decades, and both technical (*e.g.* preparation, design, construction, maintenance and operation) and financial aspects (*e.g.* feasibility studies; cost-benefit, availability and affordability analyses; financial closure; financing; remuneration; and return on capital). Very large amounts of money are involved, meaning that the financial closure of the project requires the engagement of many different entities apart from the primary parties, such as banks, *etc.*

Fundamental to any PPP is the transfer to a private partner of the realisation of tasks associated with public responsibilities, including both the commercial and social objectives of the project. Furthermore, the contracting authority is public, as are the monies spent (directly or indirectly). These points distinguish PPP projects from strictly commercial transactions.

Needless to say, such arrangements need solid legal and regulatory frameworks to function properly, protecting the interests of all parties involved, including those of users and the general public. The public nature of the assets and taxpayers' special interest in the project should be recognised; this could include, for example, stipulations regarding the need to show value for money before undertaking a PPP, as discussed in Chapter 5.

8.3.1. Enabling legislation

Clearly defined policy regarding PPPs, often enshrined in legislation, can play an important role in ensuring that these instruments are employed based on objectives that include sound economics.

Beyond this, a legal framework is a prerequisite in order to establish the basic legitimacy of a PPP and allow the government to delegate functions for which it is otherwise responsible. New institutional structures often need to be designed, laws must be amended or new legislation created and adopted, and regulatory oversight functions must be established and strengthened. Most importantly, the organisation of the existing service provision should be restructured to allow for effective participation and competition by private sector operators (Sader, 2000).

At a basic level, the legal and regulatory environment for PPPs should provide stability and consistency. Regulatory mechanisms should guarantee neutrality and fairness for the private party, and enable the public authority to ensure that policy objectives and conditions are met by the private operator. Public authority decisions must be based on straightforward, transparent and unambiguous procedures, with independent (*i.e.* non-political) jurisdictional control (Aoust *et al.*, 2000; Virtuosity Consulting, 2005). More specifically, for the development of PPPs, the legal/regulatory and institutional framework should:

- Support investments in the complex, long-term PPP formula.
- Facilitate the reduction of transactions costs.
- Assure the appropriate regulatory controls.
- Provide legal and economic mechanisms enabling the solution of problems and disputes that might occur between the parties involved (Bruzelius, 2005).

In order to make PPP arrangements possible, the specific framework should thus include at least the following provisions:

1. Provisions that make the project possible and facilitate its functioning, including:
   - The legal right to establish a project company.
   - Offsetting existing laws that would impede the existence or functioning of the new entity (*e.g.* laws that limit tolling, reserve the provision of infrastructure for the public sector, insist on the earmarking of fuel taxes, set minimum levels of public involvement in infrastructure-providing firms, *etc.*).
   - The terms and conditions under which public assets may be transferred to non-public entities.
   - Establishing the responsibilities of infrastructure providers, including with regard to such issues as levels of service, information reporting requirements, *etc.*
   - Establishing the responsibilities of government, both to external infrastructure providers and to the public.
   - Establishing the corporate governance frameworks for special purpose vehicles.
   - Establishing the conditions and procedures for tendering and contracting.
   - Securitisation of revenue flows to the project company.

- Direct agreement between the contracting authority and financiers to allow the former to take control of the project under certain conditions.
- The power of the project company to choose sub-contractors and on its own terms.
- Clear rules regarding the revocation of the project agreement and related compensation to owners of the project company.
- The right to raise tolls, where relevant.

2. Provisions that enable governments to provide financing, where relevant, including those that:
   - Enable government to provide subsidies.
   - Enable government to make long-term commitments of public expenditure (in principle for the entire period of the validity of the project agreement).

The design of the legal framework will vary from country to country, as a function of legal tradition and existing laws. Furthermore, the framework is typically not only identified in laws and regulations, but also set out in policy documents, guidance notes, and similar instruments (Bruzelius, 2005). Indeed, some elements in the above list may be established in contractual arrangements. The exact nature of the legal/regulatory framework will also depend heavily on the types of financing mechanisms contemplated, including which responsibilities are transferred to the private partner.

A mistaken assumption is that regulation is not desired by private investors. While investors likely do not favour a rigid and intrusive regulatory structure that limits their ability to operate assets in an efficient manner, they require a regulatory framework that provides transparency regarding the future operating environment and minimises the risk of undue interference by the government during the operating phase. Investors will demand a clear set of rules and regulations that provides the basic guidelines under which a specific infrastructure service can be provided (Sader, 2000). The same could be said of lenders.

8.3.2. Different models of PPP legal/regulatory frameworks

The legal/regulatory foundations for PPP arrangements are different according to countries' legal traditions. However, a general framework always exists.

The existence of a specific PPP act is not a prerequisite for PPP development. The legal framework can also be provided by way of changes to other existing legal provisions impacting on the PPP scheme. For example, the UK, which is considered a PPP pioneer and where a great many projects have been realised, has no specific PPP law. A specific PPP law has been introduced in Belgium, Chile, Ireland, Italy, Korea, the Philippines, Poland, Portugal, Romania and Spain, among others. Sometimes, PPP laws focus on a specific aspect of transport, particularly motorways; in other instances they are written to apply to arrangements in all sectors

In any event, if a country chooses to enact a PPP law, this will require changes and reference to other binding legislation and regulations. In Poland, for example, the *PPP Act of 28 July 2005* also amended various other laws, dealing with such issues as public roads and their financing, rail transport, health care establishments, the management of agricultural real estate, income tax, and war graves and cemeteries, among others.

No direct link has yet been established between different types of PPP legal or regulatory frameworks and the development of projects, or the quality of their performance. However, recently,

dynamic growth in PPP projects has been observed in countries where special legal regulations have been introduced, notably Chile, Italy, Ireland, Portugal and Spain.

PPP laws can be a useful means of establishing fundamental principles that should be adhered to in establishing such mechanisms, such as the need to show value for money, and to ensure ongoing transparency and accountability in the provision of infrastructure.

One generalisation is that if a country's public sector has limited experience in realising different competitive schemes, it is particularly important to have a special legal framework dedicated to PPPs. Furthermore, the actual process of developing a PPP law, including expert analysis and public discussion, may also have a significant, positive influence on the government's understanding of specific concepts and ideas, mechanisms, roles, responsibilities and the interests of different players, which will assist in the implementation of PPPs.

8.3.3. Legal frameworks and risk allocation

As discussed in Chapter 6, risk allocation is at the core of a PPP scheme. This may have important implications for the costs involved, as private partners will expect to be compensated for any unavoidable risks they assume. The extent of risk delegation also determines whether an investment scheme is considered on or off a government's official balance sheet.

As a result, risk allocation is often reflected in national PPP laws and/or the general public finance/budgetary legal framework, as well as in international regulations and guidelines, such as those of the EU (see Chapter 3). In Poland for example, additional regulations beyond the PPP law define the risks related to a PPP undertaking, how these are allocated, and their influence on the public debt and deficit.

Furthermore, where risk allocation is integrated into the legal/regulatory framework, this will imply a need for the evaluation and monitoring of arrangements, and thus for different public institutions, such as those responsible for auditing and oversight.

8.3.4. Ownership considerations

During the realisation of a PPP project, infrastructure can be owned by the public partner and operated by the private partner. Also, assets can be temporarily transferred from the public to the private partner, which may own and operate the infrastructure and then transfer it back to the public partner at the end of the project life cycle.

The legal framework must allow for the chosen solution to be put in place, depending on the project. Furthermore, the interests of both parties should be protected, and the movement of assets should not create groundless additional costs.

Prior to entering into a PPP arrangement, the public partner should determine what the legal status of infrastructure assets will be. This could include, *inter alia*, whether these assets will be transferred to a private entity, and under what conditions; whether they will be established by the private entity to be employed by the private partner; or whether they will be placed under the responsibility of a special purpose vehicle.

8.3.5. Cost implications of different legislative models

Existing legislative frameworks in most countries do not typically have provisions that explicitly aim at reducing transaction costs. However, the structures of different legislations have clear

implications for project costs, including the costs for bidding, selecting a partner and negotiating the contract. Bruzelius (2005) has examined this question and notes that the most important elements with regard to reducing transactions costs in PPP arrangements were those that particularly focussed on streamlining the procurement process. Much of this is established in policy guidelines and regulations, as opposed to legislation. Specific examples are considered in Chapter 9, dealing with procurement.

In general, elements of the legal framework – including tax, accounting, public finance, public aid and competition rules, and specific sectoral regulations (*e.g.*, on safety, third party access, equal treatment, *etc.*) – may also generate new costs for the infrastructure provider, which will ultimately be passed back to the user or principal, depending on the payment scheme. The execution of the oversight function by government will also need to be paid for out of tax revenues. These additional costs should be taken into account in determining whether the proposed infrastructure provision scheme is cost-effective in comparison to the new efficiencies that it provides.

8.3.6. Public sector structures for overseeing PPPs

As representatives of the public good, governments must also be prepared to negotiate contracts and oversee relations with highly skilled external infrastructure providers. This involves having the appropriate competencies and institutional structures available to efficiently and adequately manage the process. Because of the complexity of these arrangements, PPP contracting imposes much higher capacity requirements on the public sector than traditional procurement.

An important initial observation is that the required competencies and knowledge must be developed over time. Governments that do not have experience with more complex contracting out, like Design-Build models, cannot expect to be immediately able to manage PPPs. This may be particularly relevant in emerging economies, where even simple outsourcing is often not the norm. However, the process of developing policies and legislation – which would likely involve studying international experiences – can play an important role in developing knowledge.

Many governments create structures within government specifically to support the PPP process. Concentrating PPP expertise in one area of government likely saves on costs in comparison with developing this expertise in each individual ministry dealing with areas subject to PPPs, such as health, transport or energy. It also allows for a consistent, whole-of-government approach, as opposed to fragmentation that might lead to incoherent practices. Of course, sector-specific technical knowledge is also important in designing particular arrangements.

Such institutions include the UK's Treasury Taskforce, Partnerships UK and 3P, which have played a particularly important role in that country's use of PPPs (see the Annex). Similarly, when the Czech government formulated steps for implementing PPPs in 2004, it mandated the establishment of the Czech PPP Centre as a separate unit of the Ministry of Finance, and the National Council for PPPs. During the following year, the Czech PPP Centre prepared a pipeline of PPP projects, which were then adopted by the government. In the Czech PPP framework, the Ministry of Finance acts as a regulator for PPP project approval. The Czech PPP Centre plays an important role in developing PPP schemes, ensuring learning from national and international experiences, assisting with project set-up, monitoring progress, and further developing methodologies and guidelines. Various other examples are also seen around the world.

8.4. Conclusions – Implications for efficiency

Whatever the model chosen for the provision of infrastructure, mechanisms must be put in place to protect the public interest and oversee the process. Where infrastructure is provided by a

government ministry or agency, this oversight can be provided by interface between government bodies, such as the transport and finance ministries. However, the delegation of responsibility for the operational tasks of infrastructure provision transforms the role of government to one of client, and creates the need for new institutional arrangements.

Principal among these is the need for legislation and regulation to facilitate the existence of new models and ensure that public interest objectives are attained, as well as to provide a stable operating environment for independent infrastructure providers. This likely also creates the need for new structures within government to create and administer regulatory frameworks, and monitor compliance.

The costs of creating and implementing legislative and regulatory frameworks should not be ignored in overall cost-benefit analysis focussing on the value for money of different models. These institutional arrangements are essential for ensuring overall efficiency in the provision of infrastructure, but also involve new costs that should be considered when calculating the relative efficiency of different models.

KEY CONCLUSIONS

- PPPs require a solid legal and regulatory framework to protect the interests of all partners – public and private – including by ensuring that public policy objectives and contract provisions are met, and by providing a stable business environment.
- This does not imply a need for interventionist government policy. However, legislation must enable the existence of infrastructure-providing entities, allow for the transfer of public assets, establish the responsibilities of different partners, outline corporate governance standards, consider any specific required provisions, and establish the terms of tendering and contracting processes.
- Legal frameworks will differ from country to country, based on existing legal traditions.
- For the most part, PPP legislation should facilitate investments by reducing risk due to uncertainty, reducing transactions costs, providing for appropriate regulatory controls, and allowing for conflict resolution. It can also establish the principal elements of good governance that must be taken into consideration in establishing arrangements.
- Laws often dictate how risks may be transferred, and whether this risk transfer allows for investments to be considered as being off a country's balance sheet.
- They may also dictate such issues as the tolls that can be charged, the extent of cross-subsidisation allowed, and other details regarding the overall structure of investment projects.
- Governments need to develop the appropriate expertise to manage financing processes, including negotiation with, and oversight of independent infrastructure providers. Creating a single infrastructure financing or PPP unit for all of government, as opposed to developing such expertise in each ministry, can reduce duplication and allow for greater coherence.
- The creation and oversight of new legislative and regulatory arrangements also involves costs, which should be factored into overall considerations of the relative efficiency of different models for the provision of inland transport infrastructure.

9. PUBLIC-PRIVATE PARTNERSHIPS PROCUREMENT AND QUALITY CONTROL

9.1. Introduction

Where PPPs are employed, the procurement process itself – involving tendering and contracting – is essential for establishing the overall frameworks for the resulting project, and thus for achieving desired efficiency gains. In order to achieve optimal outcomes, PPP procurement must be carefully designed and supported by adequate quality assurance mechanisms.

We start in Section 9.2 by discussing the peculiarities of PPP tenders compared to other public procurement. In Section 9.3 we address the organisation of the tendering process in order to enhance the chances for successful procurement, including international procurement issues. Section 9.4 then considers contracting, and, in particular, the necessity for effective quality control and measurement.

9.2. What is so special about PPP tenders?

PPP arrangements include various elements that differentiate them from other public procurement.

First and foremost, PPP contracts stretch over longer periods of time than most standard government contracts. A consequence is that important fundamentals for the project will likely change during the contracting period. It should therefore be obvious to parties entering into this type of contract that it may have to be renegotiated before the termination date. This brings into play the third P in the acronym – these arrangements are intended to be *partnerships*; both parties must be flexible when facing events not accounted for in the original contracts, and respect the objectives of the counterpart.

Secondly, large amounts of money are involved, and many PPP contracts require elaborate contractual details regarding how the financing structure is to be organised, for instance with respect to the debt-equity ratio. It is also important to establish a formula for how the contractor should be paid for services during the contract period.

A third distinctive feature of PPPs is that the focus of the contract should be on the result of the activity – on performance – rather than on *how* a road or railway is built. This makes it different both from more limited infrastructure projects, such as simple contracting out by lots or a Design-Build project, and also from the standard procurement of items that are used as inputs in the production of goods and services. It also necessitates a close monitoring of performance during the project's lifetime to ensure that the agent delivers.

From the commercial participant's perspective, just as in any procurement, the primary concern is how to estimate the costs for undertaking the task. The core of any successful bid is that the preparation phase must correctly envisage what will have to be done and what this may cost in order to make future payments sufficient to make up for resources that are used.

In this, any uncertainty will add to the costs. The possibility of poor future cost realisations must be accounted for. For example, the bid may be based on costs for an expected "bad-weather winter" rather than on average winter conditions, or may average bad and good weather outcomes but add a premium for accepting the risk of a bad outcome.

Before a bid is submitted, each participant in the process will typically assess how many competing bids there will be. The larger the number of competitors – *ceteris paribus* – the more fierce will be the competitive pressure. With many competitors, the winning bid will therefore have to be close to production costs, since the chance of winning the tender will otherwise be small, and the winner's profit will thus also be relatively small. At the other extreme, less competition does not induce competitors to submit lower bids, and may result in unjustifiable profits at public expense.

This last point underscores the importance of competition from the principal's point of view. Competition, as in any procurement process, is the primary source of the efficiencies to be gained from PPP arrangements.

9.3. The tendering process

The tendering process itself is essential in ensuring adequate competition, and thus must be appropriately designed. We will consecutively consider the preparatory phase (Section 9.3.1), innovation issues (9.3.2) and the transaction costs associated with PPP projects (9.3.3).

9.3.1. Preparations

Given the scope and complexity of infrastructure development, PPP procurement processes are typically long and complicated. Virtuosity Consulting (2005) suggests that most successful PPPs require a gestation, planning and implementation period of at least ten years.

Tendering may also be costly in itself, both in terms of the costs incurred by governments, and by companies preparing bids. The costs can be even greater at a later date if procurement is not carried out appropriately, as this can lead to failure of the PPP model and resulting renegotiations.

KPMG (2005) considered the key factors that determine the viability of PPP projects. Their conclusions indicate that many projects that encounter downstream problems do so largely because of poor design and conceptualisation. In particular, they point to the following bases of viability:

Project realism: The project must be developed based on realistic projections and suppositions. This includes whether the government can genuinely afford the necessary subsidies, the robustness of demand forecasts, whether users will accept tolls, and how alternative service providers might respond by becoming more competitive. Box 9.1 provides an example whereby a project failed due to an inadequate assessment of the public's willingness to pay user charges. The German, Hungarian and Mexican examples in the Annex show how inappropriate assessments of demand risk can lead to subsequent problems, and how these can also be linked to toll rates. The Swedish example shows how revenues from a PPP project can be reduced when alternative service providers improve their service.

Project preparation: Have all necessary administrative steps been undertaken in the planning process? This includes appropriate cost-benefit analysis – a project with an unforeseen low rate of return can never be saved by a diligently implemented procurement process – as well as definition of the project's scope and requirements. It also involves ensuring that the project does not conflict with other policy initiatives and objectives. Furthermore, the design of the tendering process itself is a fundamental element of the preparation process.

Projects must be well designed and thought through, in order to provide stability with regard to procurement and financing. Objectives and requirements should be closely considered and clearly articulated to protect both the public and private partners from unforeseen changes at a later stage, which could be expected to lead to costly renegotiations and delays. Box 9.2 provides an example of the consequences when this is not appropriately dealt with. It is also essential to have major approvals, environmental and other assessments, and land acquisition in place well in advance, in order to avoid delays and having to reopen contracts.

Preparation also involves consultation with stakeholders. Before tendering begins, broadly-based political and public debate regarding project and procurement design should take place. This will narrow the degree of uncertainty regarding contract details at later stages. Furthermore, there may be considerable public opposition – for instance focussing on the implications of the project for the environment, for local communities and for land owners, among other elements – and litigation is often part of the process. This opposition should be built into timelines and planning, not least of all because it may be mitigated by appropriate consultation.

There is, however, a trade-off involved in how far these preparations should be taken. Performance contracts are based on the assumption that the contractor is also closely involved in the design of the project. If the task description and the requirements provided by the principal are overly detailed, they may prevent the agent from finding innovative solutions.

Legal and Regulatory Environment: Chapter 8 discussed the need for a solid legal and regulatory environment to legitimise and facilitate the use of PPPs.

Financial market strength: Successful PPPs require the existence of financial markets with sufficient depth and liquidity to facilitate long-term lending at sustainable interest rates, as well as appropriate debt instruments. Where such conditions do not exist, this must be foreseen and mitigated, such as by way of the participation of international financial institutions.

Bidder and government expertise: Adequate competition to ensure efficiency requires the participation of the widest possible range of bidders in the process, representing the best international expertise available. Processes must thus be prepared in a way that allows and encourages such participation.

At the same time, it is important that the right expertise be retained by governments to ensure that they can negotiate with highly knowledgeable private partners from a position of strength. Often, governments do not have sufficient technical capabilities in house to carry out all parts of the preparatory process, leading to a need to contract external expertise for project design and for reviewing bids, and raising the overall cost of the process.

One way of managing this may be to allow an interested firm to participate in the project design, with the assumption that it will also be able to participate in the later tendering process. That firm could be compensated for its participation in the project preparation in the event that it does not win the tender to actually implement the project. Box 9.3 describes a process in the US where a private firm has been engaged in the conceptualisation of a project. Box 9.4 provides an example of the use of unsolicited proposals in Italy. However, it is important that this way of organising the process be carefully managed to ensure that all participating firms feel that the selection is transparent and fair. If the enterprise that participates in the development process is given too large an advantage in the subsequent tendering, the competitive pressure may be undermined.

Box. 9.1. Rejection of user charges for the Skye Bridge, UK

The Skye Bridge is a toll bridge connecting the mainland of Scotland with the Isle of Skye, completed in 1995 as one of the earliest projects under the UK's PFI (see the Annex). The bridge cost approximately GBP 25 million to build, and the Scottish Development Department spent an additional GBP 12 million for approach roads and design modifications, and GBP 3 million in negotiating the arrangement. The project was an initial success – revenues were higher than expected due to high usage and the time estimated for the recovery of project costs was revised from 20 years to 17. However, despite the fact that the Scottish Executive provided direct government grants of approximately 12.5% of total revenues to minimise user fees, and that overall project costs were reduced by government contributions for land purchase and road construction, tolls generated a great deal of local opposition. Residents felt that they were treated unfairly because the direct ferries had been discontinued and there was no alternative means for drivers to reach the island. Opposition was so strong that the Scottish Enterprise Minister decided to abolish tolls and buy out the shareholders for GBP 27 million in 2004 (KPMG, 2005).

Box 9.2. The Beiras Litoral and Alta Shadow Toll Road Project

This project involved the upgrading of a motorway from the west coast of Portugal to the Spanish border, on the basis of a shadow toll. According to the EC (2004b), among the basic lessons learned in implementing the project was that a lack of a clear statement of the project objectives (standards of quality and service required) resulted in the possibility of sub-standard bids in the initial tendering stage, forcing an upgrade of proposals in the second stage, with corresponding increases in the proposed level of shadow tolls. This reduced the degree of effective bidding competition, as bidders were allowed to present unrealistic proposals and prices, given that they knew that the projects would be forced to upgrade, creating the chance for increasing prices.

Box 9.3. Contractor involvement in project development in Oregon

Legislation in the US state of Oregon from 2003 allowed for the creation of the Oregon Innovative Partnerships Program. The legislation allows private sector partners to begin participation in transport projects during the conceptual stage; allows the Oregon Department of Transportation (ODOT) to solicit proposals, or accept unsolicited proposals; ensures the confidentiality of proprietary information submitted in project proposals and negotiations; and allows the streamlining of prequalification by exempting transport projects from most requirements of the state procurement law (Whitty, 2004).

In January 2006, the Oregon Transportation Commission (OTC) approved a request by the Oregon Department of Transportation to proceed with pre-development work on three highway projects, collectively worth over USD 1 billion, in partnership with a consortium, the Oregon Transportation Improvement Group (OTIG). That work will take approximately 18-24 months to complete, and involves analysing the feasibility of technical, commercial, financial and operational options. If, at the conclusion of the pre-development work, it is determined that the projects are both technically and fiscally viable, ODOT will request OTC approval to enter into implementation negotiations with OTIG (Oregon government web site, 2006).

Box 9.4. Unsolicited Proposals for PPPs in Italy

Under Italy's 2006 Code of Public Contracts, private companies can play a decisive role in initiating projects by submitting an unsolicited proposal. After, they may design the project, and participate in a tendering process. Unsolicited project proposals can be submitted by June 30 of each year or, if no other proposals have been put forward for the same project, by December 31, and should be based on the government's pre-approved plans for infrastructure development.

These proposals must include:

- A study of territorial and environmental arrangements.
- A feasibility study.
- A preliminary design.
- A draft agreement.
- An economic and financial plan certified by a bank or by an audit company.
- A specification of service and management characteristics.
- An indication of the costs; quality issues; the technical and aesthetic value of the proposed work; the environmental characteristics; the use and maintenance costs; work execution times; performance; the duration of the concession; the methods, standards and criteria of setting user charges; and the guarantees offered by the project developer to the public authority.

Proposals shall, moreover, detail the expenses incurred for the preparation of all the documents, which cannot exceed 2.5% of the investment value.

The proposals are then evaluated by the public authority within four months after being received, based on their technical specifications with regard to building, planning and environmental elements, design quality, functionality, usability of the work, accessibility, management and maintenance costs, duration of the concession, times required to complete the works, applicable rates, methods of rate updating, the economic and financial value of the plan, and the contents of the draft agreement. If the proposal is accepted, the public authority issues a call for tenders within three months after the evaluation, based on the proposal, with any required modifications.

The tendering process involves two stages, the first of which includes assessing a financial bid, followed by a negotiated procedure between the two best bidders and the company or consortium that initiated the project in the first place.

9.3.2. Tendering and innovation

The introduction of innovations is seen as one of the principal benefits of PPPs. For example, the use of innovative techniques is seen as a key to the success of the Confederation Bridge project in Canada, which was delivered on-time and with no cost overruns borne by the state (Virtuosity Consulting, 2005).

For innovation to occur, specifications or standards set by the public sector should provide enough room to manoeuvre to allow the private sector to choose innovative techniques and technologies for designing and constructing a transport project (Singapore Ministry of Finance, 2004). If specifications imposed by the public sector are such that innovations are not cost-effective or even

applicable, the private partner will be reluctant in pursuing them. There is, however, an inherent trade-off between the degree to which the means of carrying out tasks is pre-established, which reduces transaction costs, and the openness towards alternative ways of implementing the work.

It is the life-cycle approach to infrastructure development, in combination with the focus on performance, that is the prime mechanism for encouraging innovation in PPP projects. The long contract period and the control over both construction and maintenance are intended to make the contractor think about ways to reduce costs over the period during which the contract is valid. Upon assuming certain risks, the private partner will also be expected to take steps to reduce those risks, or mitigate their potential impact. Moreover, the principal asks for a product that should perform in certain ways as the prime result of the project. A corollary is that rules and regulations relative to how a project is to be built should not be excessively limiting. Rather, the main potential benefit of PPP projects lies precisely in that they leave room for innovative thinking.

With this in mind, the level of detail of tender documents may be important for the degree of innovation. One example is the flexibility allowed with regard to the options that may be proposed by bidders. When the UK tendered concessions for motorway development in England and Wales in 1994, the Highways Agency disclosed to bidders its own design proposals as "illustrative requirements" that were not mandatory, thus allowing bidders to propose numerous cost-effective changes (UNECE, 2000).

Another mechanism applied to promote innovation is that of confidential discussions of alternative designs and bids. In this way, bidders have the ability to propose innovative solutions without the danger of having their ideas shared with competitors. In addition, this allows the principal to examine and evaluate innovative ideas during the procurement process and not after awarding the project. According to the FHWA (2002), this mechanism promotes innovation, although the evaluation of bidders may take longer. An example of this method was found in the bidding process for the Netherlands High Speed Rail South project, which was awarded after confidential discussions between the procurer and different bidders. The project included a bored tunnel, with a view to preserving natural areas on the surface. While the original design proposed by government authorities involved a shorter, two-bore tunnel with connections between the bores, the final contractor proposed an extremely large, one-bore tunnel, longer and safer than the one the government had originally envisaged.

9.3.3. Transaction costs

Bruzelius (2005) studied the potential impact of legislation and regulation on transactions costs. This section is largely based on that work, with additional references.

Dudkin and Välilä (2006) define transactions costs in PPPs as "the costs of establishing and maintaining a partnership; more specifically, they encompass legal, financial, and technical advisory costs incurred by both public and private sectors in the procurement and operational phases of a project." For example, the following cost components, *inter alia*, are assumed to contribute to search and information plus bargaining costs, and can be incurred both by the public and the private partners:

- Prepare and submit documents for pre-qualification.
- Prepare tender documents.
- Prepare and submit bids.

- Evaluate bids.
- Prepare a short-list of qualified bidders.
- Negotiate agreement until signature and financial closure.

It is generally believed that PPP contracts give rise to higher transaction costs than most "normal" contracting, although little concrete evidence is available. The first DBFO contracts in the UK, for example, took 18 months from advertisement until financial close, and later projects have taken 13 months, on average. The financial costs associated with tendering those projects were reported as being 11 times higher than for traditional simple outsourcing contracts and 3 times higher than for a Design-Build contract (NAO, 1998). As noted in Section 5.3, Dunkin and Välilä describe the significant costs incurred by winning and losing bidders and governments in PPP procurements, although they do not compare these to standard procurement.

There are several possible reasons why PPP contracts are more expensive. One is related to the high costs of *ex ante* analysis. In general, the transaction costs of the procurement process are very much related to how well the public partner prepares, and, therefore, how well it actually understands the conditions of the project

In the PFI process in the UK and Ireland, value for money analysis is required, including the use of the public sector comparator (as discussed in Chapter 5). Similarly, Spanish legislation also demands that the government carry out an up-front feasibility study for any public works project. The advantage of this approach is not only that some of the hurdles for obtaining the required permits may be overcome earlier, but also that the public partner develops an understanding of the costs of the projects, as well as of the financial conditions of a possible concession. A well-prepared feasibility study, therefore, makes it possible to draft good requests for proposals, and also to effectively evaluate the proposals submitted by the bidders.

The costs for technical specifications may also be higher. The legal approach used in some countries in Southern Europe and Latin America (*e.g.* Chile, Italy and Spain) entails detailed specifications of the selection process and the contents of the project agreement. The fact that so much is already set out in the laws and regulations in effect limits the scope for how to design the contract, thereby speeding up the tendering process by reducing the need for negotiation on key project elements. It is, however, also costly.

The standard approach to the procurement of public works contracts involves a pre-qualification stage intended to identify qualified or eligible bidders, and to reduce the number of bidders to a manageable short list, usually comprising three to six sponsors. However, Spanish law retains the possibility of using an "open" bidding process, allowing for bids to be prepared without pre-qualification, in order to reduce the time of the procurement process. Presumably, this approach is most feasible when the concessioned works are of such a size that the number of bidders would likely be limited anyway.

Following pre-qualification there are basically two types of procedures for selecting the private partner: negotiated and non-negotiated. In the latter, it should be possible to put a price on the project based on the information made available through the request for proposals, while the former requires further negotiations to arrive at the price. The need for negotiations is greatest when output specifications have not been finalised, certain risks have not been allocated to either party *ex ante*, and aspects of the payment mechanism are not yet fixed. However, with very detailed project

specifications, it is possible to prepare a project so that pricing can be achieved without negotiations. This likely requires additional preparatory work, but may reduce transaction costs in the longer term.

In the Spanish system, the information submitted in the bids is expected to be adequate enough to determine not only qualified bidders, but also their ranking. Efficiency is apparently also achieved by not differentiating between the technical and financial proposals, as is otherwise a common approach in public works tendering, which is again possible because the request for proposal sets out the project and the draft contract in great details. The framework for the allocation of risks is given *ex ante*, as is much of the tariff regime. The Spanish approach to procurement is thus structured in such a way that it should be possible to price the bid based on the request for proposals, thereby eliminating the need for negotiations.

The Spanish track record for the speed of contracting is, indeed, exceptional. In general, the total period until closure is about eight months. This is significant, given Dudkin and Välilä's (2006) finding that long procurement times are associated with higher transactions costs, especially for the public sector. Some additional features of the Spanish process that contribute to reducing transaction costs are (i) that during tender evaluation bidders are able to review each other's offers, thus ensuring full transparency and early elimination of potential conflicts; and (ii) that financial closure does not have to be reached at the time of the conclusion of the project agreement. Instead, the successful tenderer has to pay a 4% (of the total investment) bid bond to ensure commitment to the agreement.

The Chilean legal framework also requires that a detailed design be prepared before the bidding process commences. A two-stage procedure is then used to identify the concessionaire, including a pre-qualification stage. The bid entails separate technical and financial proposals, and the latter are only considered for bidders that actually demonstrate that they are able to meet the minimum technical requirements by way of their technical proposals. As in Spain, the tender is so well specified in the request for proposals, including the allocation of risks, that there is no scope for later negotiations. The average time for road project design and awarding a contract in Chile is about 16 months.

Requirements with respect to, in particular, final designs will have a bearing on the transaction costs, but also on the actual performance of the project. Different countries offer different models for resolving this. The use of output specifications can serve to reduce transaction costs, provided that the public partner is able to set them out in the request for proposals in an unambiguous way, which, in addition, allows them to be measured and monitored. The reason is that the finalisation of a design is often a time-consuming affair, which, under the conventional approach, has to be completed prior to any works being initiated. If performance specifications are used in lieu it is, to some extent, possible to run construction and design in parallel processes.

The development of PPP procurement may be considered as a long trial and error process. Dudkin and Välilä (2006) found that transactions costs in procurement are not noted to decrease significantly even after a government has been using PPPs for many years, perhaps meaning that reductions need to result from improvements in processes, as opposed to from experience itself. As some processes become more streamlined and commonplace – for example, as governments learn how to specify and monitor performance, legal documents relevant for the PPP design become harmonised, and so on – it is reasonable to believe that at least some of the transaction costs will start to shrink.

9.3.4. International tendering issues

In order to ensure the participation of a wide range of highly qualified competitors in tendering processes, national authorities need to provide a level playing field to all participants, national or foreign. As seen in the Annex, the active provision of fair competitive circumstances – and reassuring

potential private competitors of their existence – played an important role in Sweden's Arlanda rail link project.

The European Commission has recognised this issue in the form of an initiative to study whether EU rules adequately implement the objective of creating an internal market for the free movement of goods and services where PPPs are concerned. This resulted in a "Green Paper" adopted in 2004, and a Communication in 2005. In general, associated consultation with stakeholders revealed demand for a stable, consistent legal environment for awarding concessions at the EU level, with a view to reducing transactions costs by decreasing legal risk, and generally enhancing competition. Work is ongoing within the Commission to follow up on these initiatives (EC, 2004 and 2005).

For the most part, there does not generally appear to be a serious impediment in most countries with regard to cross-border involvement in PPPs. Indeed, many countries openly espouse the benefits of ensuring competition from the wider international community of experts, as seen in the case studies regarding Mexico and Sweden in the Annex. The Mexican example reveals an important change from previous practice.

Indeed, there is even some indication that a bigger challenge may be that of market concentration in the hands of a few international firms in the construction sector (Estache and Serebrinsky, 2004). This concentration of major PPP players involves a relatively small cast of potential international bidders.

Using data from Public Works Financing, Estache and Serebrinsky (2004) note that six infrastructure companies controlled about 50% of construction deals in infrastructure (transport and utilities), and 16 companies supplied about 90% of the market. Where new concessions and PPP projects over USD 50 million signed between 1985 and 2003 were concerned:

- Seven Spanish companies accounted for 52%.
- Four British companies accounted for 14%.
- Four French companies accounted for 14%.
- Two Australian companies accounted for 9%.

Other participants include Japanese, Norwegian, Italian and US contractors and operators. Many of these companies have a certain degree of regional specialisation, which further limits competition.

Benitez and Estache (2005) note that, in Latin America in the 1990s, 76% of all transport auctions involved 3 bidders or less. They also point out that this limitation in competition results from the fact that companies may seek to limit their risks by investing as members of a consortium.

Increased risk to the public sector could arise as a result of sector consolidation. Large operators in joint ventures with local construction companies may feel confident that they will be able to take on the regulators in case of conflict, and thus force contract renegotiation (UNECE, 2003; Virtuosity Consulting, 2005).

Given the extensive capital, knowledge and technology requirements for PPP project management, as well as the economies of scale and scope, it should come as no surprise that large-scale projects attract a limited number of highly specialised and experienced firms (Benitez and

Estache, 2005). Effective *ex-ante* competition tends to be modest even in some of the best organised tenders.

At the same time, many countries eager to expand their national companies' expertise in the PPP sector have successfully encouraged the involvement of local construction and engineering firms as partners to the major international actors. Indeed, there is a clear value to international firms in having local knowledge, including of legal systems and business practices. Bidding companies typically involve consortia of "smaller" local and "larger" foreign companies. As a result, there are local gains in terms of the transfer of know-how and reductions of the overall risks associated with these strategies. However, these gains do not necessarily offset the risks associated with limited competition.

9.4. Contracts

The contract is a core element of the overall governance structure of a PPP. Good design and management of contracts are essential for the efficient transfer of risk to the private sector. Obviously, the contract must closely reflect the terms and conditions established in the tendering process, subject to further negotiation of details with the successful bidder.

A contract must satisfy the contracting company and its shareholders, lenders, the public, and the users of the infrastructure. Whether the outcome will represent "value for money" depends on the precise terms of the contract, the way in which it is awarded and how it works in practice over the life of the contract. Furthermore, these agreements create a framework for a number of other sub-agreements between numerous, mostly private, actors, including, *inter alia*, sponsors, financial institutions, consultants, designers, suppliers, constructors, managing and servicing companies, and operators.

Many of the key elements of PPP contracts have been discussed elsewhere. Chapter 6 provided an extensive discussion of how different types of contractual conditions contribute to risk transfer, notably the degree to which a contract is "fixed-price" in nature. That chapter also noted the importance of foreseeing renegotiation in the contract, particularly given the life-spans and complexity of PPP projects. The following discussion focuses particularly on quality control.

9.4.1. Quality control, assurance and monitoring

The tendering process and the subsequent contract represent the beginning of a relationship that, typically, will last for decades. In order for these relationships to be effective, they must also be accompanied by mechanisms that ensure that the principles agreed to will be complied with well into the future.

In Part III it was noted that a key to success in PPP arrangements lies in contracts that focus more on overall outcomes than on specific outputs. It is precisely by allowing the private partner to determine how to reach given goals that the PPP arrangement leaves room for cost savings. At the same time, it is essential that savings not be achieved by sacrificing quality, particularly with regard to such issues as availability, physical standards (*e.g.* surface quality, *etc.*), safety and environmental standards, and the condition of the asset when it is handed back to government. Thus, the independence accorded to the infrastructure provider in PPP arrangements will only lead to successful outcomes if the contract formulates quality targets; establishes means to monitor these targets; and provides economic incentives to remunerate above-target, or penalise inadequate performance.

Generally speaking, basic mechanisms used to ensure the quality of a project can be categorised as follows:

- Contractual provisions.
- Project monitoring.
- Audits.
- Quality standards.
- Incentives.

These are inter-related. For example, monitoring should be supported by quality standards set by the public partner and contractual provisions that act both proactively and reactively to ensure that the private partner follows these standards. Contractual provisions may include incentives, penalties or even the possibility that the public partner might undertake total project control in case of severe failure in assuring quality (World Bank, 1998).

Quality control can be defined as a set of operational techniques and activities aimed both at monitoring a process (*e.g.* construction, maintenance, operation, *etc.*) and eliminating the causes of unsatisfactory performance. In general, quality control ensures that the materials and methods used to carry out a project will lead to the anticipated result (Hudson *et al*., 1997).

"Performance-based contracting" is a tool for quality control and assurance (FHWA, 2002). Performance standards are specified in the contract and payments made according to the contractor's ability to meet or exceed these. For example, the contract could establish (a) a baseline, yearly payment from principal to agent and (b) a system of bonuses and/or penalties for above or below-standard performance. The particulars of contract design are the only safeguard against allowing the infrastructure to deteriorate in quality from the users' perspective. The size of the penalties and bonuses therefore has to be calculated with much prudence. The owner often entrusts the contractor with quality control of the project, while audit procedures are used for quality assurance.

Various examples exist:

- The UK PPP model includes a contractual incentive if a road operator provides better results in road safety compared to other roads (Harris, 2004).

- The Annex provides an example from Spain whereby the new concessions law requires concessionaires to adhere to the technical, environmental and safety regulations in place at any given point throughout the project life cycle. This is reinforced with a system of penalties and bonuses linked to quality indicators.

- In the Netherlands, bonuses have been awarded to contractors for above-average work. A yellow card/red card system is used to control design and operation of a project. Deviations in quality may lead to penalties, such as payment reduction or even cessation of the work and termination of the contract (FHWA, 2002). Several projects in the Netherlands, such as the freight rail track from Rotterdam to Germany, the Westerscheldt Tunnel and the high-speed rail line connecting Amsterdam and the Belgium border are constructed using the yellow/red card system, including fines and bonuses.

- The E18 Grimstad–Kristiansand Highway Project is one of three PPP pilot projects implemented in Norway (Norwegian Public Roads Administration, 2005). The Norwegian PPP model emphasizes (a) high road availability, (b) high traffic safety standards, (c) high environmental and aesthetic standards, and (d) good road user service. Therefore, the

payment mechanisms for the project oblige the contractor to follow the standards set by the public authority in these areas.

- The SH130 Highway project in Texas involved the construction of a 91-mile four-lane freeway at a total cost of USD 1.37 billion. The highway was designed and constructed under an "exclusive development agreement" (EDA), in which the developer participated financially. The developer was made responsible for both quality control and assurance, and undertook an obligation to retain independent firms to carry out these tasks, while the Texas Department of Transportation (TxDOT) retained the responsibility of oversight for all activities. The TxDOT later found that these independent firms performed well (Russel, 2003).

A critical element in quality control is the existence of an effective performance monitoring system. However infrastructure is provided, public authorities must be in a position to monitor the key attributes of performance of concern to them. The nature of the information that should ideally be monitored will depend on the level of control that they have chosen to exercise and their specific responsibilities.

Performance benchmarks are meant to inform decision-making and to stimulate performance and actions. Properly designed, disseminated and used, benchmarks can have a direct influence on the performance of a broad range of stakeholders.

Performance information based on a single measure, for a single year, and for a single entity is often of little value in itself. What is of interest is the trend over time and the comparison of the performance of a given infrastructure provider against other similar entities. Accordingly, the benchmarks should allow for monitoring the performance of a given entity against various standards, *i.e.*:

- Against itself over time.
- Against its domestic competitors in the same sector (assuming they exist).
- Against its international competitors in the same sector.
- Potentially, against other sectors or networks in the transport sector (domestically or internationally).

Ideally, such a system should allow for the monitoring of economic (including financial), environmental and social outcomes at various levels of detail. Serious thought needs to be given to identifying the powers, information and resources required to ensure that public authorities have the information they need to monitor performance. Of course, performance monitoring is not only relevant in PPP projects, and should be undertaken no matter how infrastructure is provided.

Such a broad, comprehensive system of performance indicators could serve many useful purposes. It would allow infrastructure providers, governments, users and the general public to assess and compare the performance of these entities over time. By informing infrastructure providers of their relative performance vis-à-vis other entities, it can stimulate actions and improve performance. It also provides an essential element for results-based accountability frameworks for the public authority. Furthermore, it provides a tool for assessing the need for corrective actions, should problem areas be detected with the performance of infrastructure providers.

Performance transparency is key to good governance and addressing the agency problem in the case of transport networks. In the case of surface transport, this problem is compounded in that there is

often no direct domestic competitor against which to compare performance. Furthermore, given the significant differences among various transport systems within countries, there are formidable challenges in comparing their performance; as a result, there are important potential gains from greater international co-operation in benchmarking the performance of infrastructure providers and favouring greater emulation from peers (InterVISTAS Consulting *et al.*, 2005). Such information could also help in informing regulatory schemes based on yardstick competition.

9.5. Summary

Where PPPs are concerned, the procurement process is fundamental to ensuring efficiency gains. Effective competition, in particular, is key. The process must be properly prepared, with a view to ensuring high levels of innovation, minimal transactions costs, and high quality in the execution of the project. It must also be supported by adequate quality control provisions in the final contract, as well as provisions for monitoring quality in implementation.

KEY CONCLUSIONS

- Effective competition is at the core of efficiency gains in PPP arrangements.
- As competition in the market is difficult to attain where infrastructure is concerned, competition for the market is essential, meaning that the procurement process must be effective, and that there should be genuine competition among viable bids.
- Tendering processes are costly. To reduce risk of unforeseen delays, extensive political and public debate should occur *ex ante*, and governments should unsure that required approvals and land purchases are made as soon as possible. This is a further argument for solid *ex ante* feasibility studies, which help to prevent future impediments to progress, as well as to familiarise government officials with the details of the project.
- The objectives and requirements of the project should be clearly established within the tendering process.
- The actual bidding process should be carefully designed to reduce costs and delays where possible, without compromising the thoroughness of the consideration of bids.
- Contracts should be designed to harness the efficiencies and innovation that can result from private partners' pursuit of profit maximisation, while minimising the possibility that profits might be obtained by under-investment. This means that, while private parties should have sufficient room to manoeuvre in deciding how to carry out key tasks, there should also be strict quality requirements.
- There should be tangible incentives and disincentives, in the form of economic and other ramifications for over and under-performance.
- Effective quality control over the life cycle of the project is clearly key. This will require the establishment of appropriate capabilities, structures and processes within government.
- Performance management is an essential element in quality control. Appropriate benchmarks must be established for this. However, this is particularly a challenge if similar projects have not occurred previously within the same country, and international co-operation may assist with this process.
- Competition for the market will be enhanced by the participation of international expert firms on the basis of a level playing field. One concern that requires ongoing monitoring is the concentration of expertise among a relatively limited number of companies worldwide.

1. NETWORKS

1.1. Motorway network management in Austria

Czerny (2006) describes motorway provision in Austria. Much of the following is based on that work.

Austria provides an example where the entire motorway network has been devolved to a state-owned enterprise. At the same time, the government retains control over tolling rates. Furthermore, public guarantees for loans reduce the costs of borrowing, although the company's debt is not consolidated with that of the state. Finally, this is also an example where a state-run company is planning to outsource important new projects by way of PPP arrangements.

In 1982, Austria's parliament founded ASFINAG ("the Motorway and Expressway Financing Corporation") as a financing company for primary roads. In 1997, the company was given the additional responsibility for planning, building, maintaining and operating the network, and also for collecting user charges.

ASFINAG is a limited liability company, the shares of which are held in their entirety by the Republic of Austria. It operates outside the public sector budget and does not receive any government appropriations. The government is represented on ASFINAG's supervisory board by the Ministry of Transport and the Ministry of Finance.

ASFINAG is responsible for Austria's 2 034-kilometre (2005) primary road system. It receives all of its revenue from a nationwide system of charging for use of these particular roads. Charges comprise three components:

- A network-wide, distance-related toll on vehicles above 3.5 tonnes, calculated on the basis of EU Directive 1999/62. An electronic system for calculating this distance-related toll on the entire network was successfully introduced in January 2004.
- A nationwide, time-related vignette system for passenger cars. All cars must have a sticker inside the windscreen in order to be able to use these particular roads.
- Six sections of the network are tolled, namely the Alps crossings at Brenner and Tauern. The tolls are charged in order to recover the higher expenses for operating these specific sections.

In 2005, ASFINAG set up a new corporate structure in which all core services are provided by eight subsidiaries. Four of them are completely owned by ASFINAG, and, in the other four, ASFINAG is the majority shareholder and a minority stake is held by different Austrian provinces. The operator of the toll system was also acquired from the Italian highway operator Autostrade, to complete the bundling of all competencies inside the ASFINAG group. One subsidiary manages greenfield construction, four are responsible for operational and constructional maintenance in different regions, one for the operation of the telematics service, one for collecting tolls, and one for external consulting.

When ASFINAG was organised in its present form in 1997, it took over existing debts of about EUR 5.7 billion, which approximately equalled the capital value of the network placed under its control. The Austrian Federal Financing Agency issued government bonds and forwarded the proceeds

of these bonds in the form of loans, with the intention of not consolidating these with the national debt. This scheme was, however, not accepted as off budget by the European Statistical Office (Eurostat).

Thus, ASFINAG returned to the capital markets in 2003 and issued bonds in its own name. A medium-term notes programme of EUR 10 billion was established, from which EUR 5 billion have already been issued. According to a government-approved plan for future investments, ASFINAG will invest approximately EUR 7.5 billion in the extension of the network between 2002 and 2015. This programme has AAA rating, because the repayment of ASFINAG's debts is guaranteed by the Republic of Austria. This rating also means that the interest rate is only slightly higher than that of the Republic of Austria itself.

This new procedure has been examined by Eurostat, which accepted that ASFINAG's balance sheet debt does not have to be consolidated with the state debt. A key factor was that more than 50% of ASFINAG's production costs were recovered from user charges (see discussion in Chapter 8).

As revenues from user charges (approximately EUR 1.2 billion in 2004) are lower than current expenditures (EUR 450 million for operation and structural maintenance, EUR 740 million for new construction and upgrading, and EUR 310 million for interest payments), ASFINAG will have to accrue new debt. In 2015, when the network extension will have been substantially advanced, the company will start to amortise its debt. At the end of 2004, ASFINAG's debt stood at EUR 9.4 billion.

In late 2006 ASFINAG signed its first PPP road agreement with a private consortium. The contract will assign responsibility for design, construction, operation and maintenance to the concessionaire for a period of 30 years. The winning bidder will be expected to finance the project by private debt and equity. Tolling will be subject to existing, nationwide tolling systems and will be conducted by ASFINAG, because the right to collect tolls on Austrian highways cannot legally be transferred to a private partner.

The payment mechanism will consist of an availability fee (~70%) and a shadow toll (~30%). On the one hand, this ensures that the project qualifies as a concession according to the Austrian procurement law, because some traffic risk – in the form of the shadow toll – is passed to the concessionaire. On the other hand, the traffic-risk-free availability fee provides the concessionaire with incentives to hold all lanes available for traffic with predetermined quality criteria.

PPP projects are planned to cover four road packages in the north-eastern region of the country. For Austria, the funding of a highway in the form of a PPP is only economically feasible under certain conditions, notably:

- The PPP project must be economically beneficial in comparison to traditional procurement. This means that value for money must be generated by the PPP structure, which is measured with a calculation model using a public sector comparator.
- The value of the project should be high enough to attract enough international interest and participation in the tendering process.
- It is not considered appropriate to set up PPP projects for sections shorter than 50 kilometres.

The primary reason put forward for the use of PPP financing within the ASFINAG network is to establish a competitive structure for motorway and expressway construction in the Austrian market, thereby maximising value for money.

The Austrian case reveals the potential complexity of a country's infrastructure provision mechanism. In summary, the motorway network has been devolved to a company that remains in the

hands of the state. This entity can undertake independent financing via private borrowing. It is also dependent on user charges, which are set by the state. In some instances, it is the part owner of service-providing subsidiaries, along with state-level governments. Furthermore, the company is also entering into PPP arrangements whereby it would act as the principal, on behalf of the state, in relations with private agents. Finally, obviously, this system only applies to motorways, meaning that the rest of the country's roads remain in the hands of more traditional public infrastructure providers.

1.2. Motorway concessions in France

Fayard *et al.* (2005) describe the development of motorway provision in France over the last several decades. The following is largely based on that text.

France offers an example whereby entire motorway networks have been devolved to companies with varying degrees of public involvement, in models that have evolved over time according to the context and needs of the system.

From the 1950s until recently, the French primary motorway network has been characterised by concessions involving various degrees of private involvement, but also public intervention. The latter has taken the form of, at different times, partial ownership by the national government, state-guaranteed loans, in-kind advances, and, at times, renationalisation. This intervention has reflected the times and needs of the system – for example, periods of intense growth or periods of economic difficulty resulting from exogenous shocks.

The current period is characterised by government divestiture of equity in infrastructure providers, ceasing other forms of support, and collecting value-added taxes from the companies, partly to ensure compliance with EU regulations regarding the budget treatment of concessioned infrastructure. The national and local governments are also increasingly looking to PPPs for discrete elements of the system. For example, the Millau Viaduct was inaugurated in 2005, based on a PPP arrangement.

From a financing perspective, France has also benefited from the establishment at a very early stage of tolling as a standard and accepted practice in the motorway system. French concessionaires collect tolls that are fixed based on 5-year planning contracts with the government, which also establish objectives regarding maintenance and investments, and companies' commitments to safety, social and environmental objectives.

The French experience confirms two points. First, that the proportion of a country's road network likely to be under concession is probably quite small. At present, the road network for which the central government is responsible, which includes all tolled motorways, represents only 4% of the country's entire road system. The rest is provided primarily by local governments, and is neither concessioned nor tolled. Second, this proportion is also likely to be very high-profile and strategically important. About 40% of overall traffic is concentrated on the central government's network.

A further interesting point regarding the situation in France is that spending by concessionaire companies is greater than overall public investment in roads (see Table A.1). This shows that independent entities can actually be responsible for a high degree of a country's investment in roads.

The primary challenges currently facing the French concessions system involve developing public sector competencies to manage relationships with fully private concessionaires, developing partnerships with these entities to achieve public policy goals, and matching tolling practices with EU regulations regarding road pricing.

The French model allows for various conclusions. The first is that governments can intervene to greater and lesser degrees throughout the life cycle of infrastructure, depending on the needs at any given time. The second is that much of a jurisdiction's most strategic road infrastructure, in terms of traffic, can be placed in the hands of concessionaires operating entire networks on a commercial basis. Third, government can continue to influence the development of those networks, by way of constant review and adjustment of the arrangements with private partners. And finally, much of the overall road system will still likely remain in government hands, requiring ongoing public investment.

Table A.1. **Expenditures on the French National Road Network, by Use and Source, 2003**
(EUR billions)

	Tolled (7 840 km)	Untolled (30 600 km)	Total
According to Use			
Maintenance	0.7	0.6	1.3
Investment	2.1	1.8	3.9
Total	2.8	2.4	5.2
According to the Source			
National government budget*	1.4		
Concessionaires	2.8		
Local authorities	1.0		
Total	5.2		

Source: *French Roads Directorate statistics, cited in Fayard* et al. *(2005).*

* Does not include government staff salaries (estimated at EUR 500 million).

1.3. Financing of the Italian motorway network

The Italian motorway sector provides an example whereby the overall oversight of the network has been devolved to a state-owned company, while operations and maintenance have been outsourced to private operators.

ANAS S.p.A. manages the Italian road and motorway network of national interest. In 2002, ANAS was transformed into a completely state-owned limited company, with its sole partner being the Ministry of Economy and Finance. The core tasks of the company are the granting of concessions, monitoring of the 25 road concessionaires that manage the tolled part of the Italian motorway network, and the operation of non-tolled roads.

Concessions for tolled motorway management in Italy were introduced in 1929. While the concessionaire companies were originally private, public and of mixed investment, today most belong to the private sector.

The formerly state-owned toll motorway operator, Autostrade per l'Italia, was created in the 1950s and has been listed on the stock market since 1999. Autostrade currently holds concessions for more than half of the Italian toll motorway network; the other half is under concession as well. Autostrada Torino-Milano S.p.A. and Autostrade Meridionali S.p.A. are also listed on the stock market.

Financing for the Italian motorway sector is based on real tolls. In addition, the road sector is also subject to a registration tax, vehicle tax and mineral oil tax, which are not earmarked for investment in the sector.

The criteria to calculate tolls are established by a detailed set of rules bundled into the concession agreements between the concessionaires and ANAS. The agreements define the terms and conditions of the concession, such as its purpose, validity, financial plan, and the reciprocal obligations and rights of the concessionaire and of ANAS. One of the aspects regulated by the concession agreements is the annual revision of toll charges, based on a complex price-cap mechanism that takes into account planned inflation, the scope of services assigned to the concessionaires and changes in the quality of the service.

Tolls are set to recover the costs of construction, management and maintenance of the motorways. The concessionaires are liable to pay 20% VAT on toll revenues and obliged to earmark these revenues for investments on the motorway network that generated them, although a profit margin is also allowed. The concessionaires are not required to adjust the infrastructure according to changed traffic volume needs, while infrastructure adjustments can be included in the concession contract, after acceptance by ANAS. All investments are usually financed by the concessionaire itself, while public funding is possible on a case-by-case basis.

The Italian case, therefore, provides another example of how key public assets can be managed by private operators while remaining in public hands.

1.4. Roads in Portugal

Portugal provides an example whereby the building, operation and maintenance of motorway networks have been systematically outsourced to private companies, using a variety of models ranging from 30-year concessions to 3-year outsourcing of maintenance and conservation. The first motorways were built, financed and operated by BRISA, a state-owned concessionaire that has since been privatised, and recent concessions include both cash-tolled motorway and bridge concessions, and shadow-toll motorway concessions. In addition, overall oversight of the motorway system has been devolved to a state-owned company.

BRISA was founded in 1972, introduced on the stock market in 1997, and completely privatised by 2001 in four stages. The company manages 11 motorways with a total of 1 050 kilometres, based on 30-year concession contracts. BRISA's core tasks are the construction, operation and maintenance of these motorways until 2032, along with the right to levy tolls. Its shares are distributed among international financial investors (BRISA web site, 2006).

There are 11 other road concessionaires building and operating another almost 1 000 kilometres of motorways and two bridges. Apart from BRISA, the other private concessionaires were selected through public tendering for construction and operation (REVENUE, 2005). Concessions are granted by the state ("Concedente") for periods of usually 30 years, after which the concessionaire's rights and operation of the infrastructure terminate, and it is transferred back to the state.

Where financing is concerned, Portuguese roads employ a wide range of mechanisms. Direct tolls are collected in four of the above-noted 11 motorway concessionaires, as well as the two bridges in the Lisbon area operated by Lusponte. Maximum tariffs levels are defined in the concession contracts (Bousquet and Fayard, 2001).

There are also concessioned motorways operated without direct tolls, including the so-called "SCUT" (Portuguese acronym for "without charge to the user") motorways. SCUT motorways are subject to a shadow toll scheme, which means that the government makes volume-based payments to the concessionaires in place of the users.

In order to moderate revenue risk in the SCUT projects, special traffic bands are applied so that that traffic risk is effectively shared. In the case of low traffic volume, the payment from the Portuguese government to the operator guarantees coverage of basic costs for operation, maintenance and debt service for senior loans. While the debt service for subordinated loans is guaranteed in the second traffic band, profit margins on the sponsor's equity is paid after the third traffic band is reached. Box 3.1 refers to problems initially experienced with the SCUT programme, whereby longer-term government payments to concessionaires were not properly taken into account in the planning stages, leading to later pressure on the public transport budget, and reforms to the policy underlying these investments, including the introduction of real tolls in some cases (KPMG, 2005). A large number of the concession contracts have been renegotiated, in the form of "Financial Re-equilibrium Agreements", as a means to compensate the concessionaires for risks assumed by the state or for unilateral changes imposed.

The concessions typically involve investments from a number of sources, including private borrowing. For instance, the funds for financing the Vasco de Gama Bridge in Lisbon mainly originated from the private sector. The concession provided for toll-collection rights on both bridges over the Tagus River, thus allowing for cross-subsidisation to help fund construction of the new bridge with revenues from the old. In total, the original financing resources for the construction of the new bridge included 35% from the EU Cohesion Fund; 33% from a European Investment Bank loan, fully guaranteed by local and international commercial banks; 6% in tolls from the other bridge; and 26% in other resources, including the sponsor's equity and state subsidies.

Apart from motorways, other national roads are not subject to road pricing schemes. Since the major tollable motorways are concessioned, the remaining national road system is basically dependent on taxpayer funding in the form of subsidies from the general state budget. There are also minor payments from public and private bodies, such as EU subsidies. Although the road sector in Portugal is subject to a vehicle registration tax, municipal circulation tax for light vehicles and motorcycles, road haulage tax for commercial vehicles, circulation tax for private vehicles and substantial motor fuel taxes, these are not classified as user revenues because they are not earmarked for expenditures in the road sector, but go into the general state coffers.

While there is considerable outsourcing in actual infrastructure provision and financing, the oversight of these arrangements has also been subject to devolution. The former Portuguese Institute of Roads under the Ministry of Public Works and Transport was transformed in 2005 into Estradas de Portugal (EPE), a wholly-state-owned company functioning under the joint tutelage of the public works and finance ministries and consolidated with the government budget for the purposes of national accounting. It is responsible for the execution of the transport policy laid down in the National Road Plan, as well as for the conception, construction and maintenance of the roads included in the plan, and for supervision of concessions and other road contracts, acting for the state as "Concedente", for example in channelling payments to the SCUT concessionaires. Tenders for new concessions and the renegotiation of existing agreements are managed by Parpublica, a unit of the Ministry of Finance, based on the PPP legislation introduced in 2003.

1.5. Highway network funding in the United States

The US Transportation Research Board recently produced a report on the American system of highway financing (TRB, 2006). Much of the following is based on that, as well as other sources.

The US provides an example whereby tax revenues related to road transport are earmarked for specific use in the transport sector, particularly for highways. These funds are, to some extent, employed in innovative mechanisms to leverage private investment, without necessarily involving the

transfer of responsibility for road provision to independent entities. At the same time, there is also increasing consideration of outsourcing via PPPs.

Spending on, and revenue from roads

Governments in the US at all levels spent USD 136.4 billion to construct, maintain and operate highways in 2004. Sixty percent of all spending and 72% of all capital spending were by the states (Table A.2). Highways accounted for 9% of state, and 4% of total local government direct expenditures in 2003.

Table A.2. **Highway Spending by Level of Government and Function US, 2004 (% Distribution)**

	Federal	State	Local	Total
Capital outlay	1	37	13	52
Maintenance and traffic services	-	11	16	27
Administration, research and law enforcement	2	12	8	22
Total	3	60	37	100

Total receipts of highway user revenues were USD 106.8 billion in 2004. This is defined to include revenue from any tax or fee paid by owners or operators of vehicles that use public roads, as a consequence of their use of the roads, and that are not paid by others.

Fuel taxes are the major user fee and account for nearly two-thirds of the total (Table A.3), although 13 states collected more in registration and license fees than in fuel taxes in 2004. Most revenues in the "other user taxes and fees" category in the table are from vehicle registration and operator license fees. Tolls are collected on roads, tunnels or bridges in 33 states, although 38% of all tolls paid in 2003 were collected in two states, New York and New Jersey. Nearly all US toll facilities are operated by publicly controlled special authorities.

The revenue figures in Table A.2 exclude bond issue proceeds, and the spending figures in Table A.3 exclude interest payments and debt retirement. State and local government bond issue proceeds for highway uses were USD 15.8 billion in 2004, equal to 12% of spending. Interest payments and bond retirements were USD 13.8 billion in the same year. Toll facilities are major issuers of bonds.

The federal government distributes nearly all of its road-related revenues to the states and local governments through the Federal Highway Program and assistance to urban public transport. State and local governments also dedicate, by law, certain revenues from highway user fees and other taxes – such as property and sales taxes – to pay for highways. They also issue bonds dedicated to highways, based on federal grants.

If revenues from these sources of funds fall short of highway spending, the difference is charged to general funds. For example, the discrepancy noted above between the share of user fees collected, and spending shares by all levels of government – *i.e.* (136.4 – 106.8 = USD 29.6 billion) – reflects intergovernmental transfers and the application of funds other than user fee revenues to highway purposes. In 2004, highway user fee revenue (whether dedicated to highways or not) equalled 78% of highway spending, and revenue from dedicated taxes other than user fees equalled 11%; this means that the net contribution from general revenues can be defined to be the remaining 11%.

To say that highway expenditures come from a particular revenue source is therefore not fully correct. The statement may be taken to mean that when revenue from the source increases, spending also increases, and that spending falls when revenue falls, which is not the case. The connection

between legally dedicated revenues and spending is, thus, typically imperfect in the highway programme. The structure of transportation finance is, thus, best understood as the result of two independent policy decisions: first, how users of transport facilities should be charged; and second, what connections should be established between the revenue raised from users and the level of spending on facilities and services.

Table A.3. **Highway User Revenues by Level of Government and Source US, 2004 (% Distribution)**

	Federal	State	Local	Total
Fuel taxes	31	32	1	64
Tolls	-	6	2	8
Other user taxes and fees	3	24	1	28
Total	34	63	4	100

Highway funding programme structure

The federal-aid highway program distributed USD 28.3 billion to the states in 2004 for spending on highway construction. The programme's rules affect total highway spending, the projects selected, and the performance of the highway system. The main features of the program are as follows:

- Periodic federal surface transport legislation provides multiyear funding authorisations for federal highway and urban transport capital grant programmes and sets rules and user charge levels. Federal rules include standards with regard to design, maintenance and safety for projects making use of federal aid.

- The amounts authorised in the legislation are distributed annually to the states. Most funds are apportioned according to formulae specified in the legislation. Apportionment formulae include such factors as each state's shares of highway lane miles, vehicle miles of travel and Highway Trust Fund revenue collections.

- The Highway Trust Fund is a bookkeeping device to make apparent the relationship between user fee collection and spending. The highway user taxes collected by the federal government are deposited in the Highway Trust Fund, divided between a highway account and a mass transit account. Payments to states are withdrawn from the fund.

Because the states are directly responsible for most highways spending, state procedures with regard to programming and budgeting have great importance for the performance of the transport system. Most states have financing arrangements analogous to those at the federal level, including trust funds and the dedication of user tax revenue to highway uses.

Although only construction, reconstruction and certain major maintenance activities are eligible for federal aid, federal law requires states to maintain roads constructed with federal aid to specified standards. States are also required to have management systems for pavements, bridges, congestion and safety. These involve the systematic collection of data on the physical condition and performance and formal procedures for planning and evaluating maintenance and construction schedules.

Transit finance

Most urban public transport services in the US are operated by special-purpose authorities controlled by local and state governments. Transit was primarily a private sector industry until the 1960s, but publicly owned systems carried 50% of all passengers by 1967 and 94% by 1980. The

industry's major sources of funds are passenger fares, other revenues related to operations (advertising, chartered buses, *etc.*), revenue from special dedicated taxes, and federal, state and local government aid.

Federal grants are about one-sixth of all funds spent. Most federal funding depends on revenue from the federal fuel tax, including the USD 0.286 per gallon share dedicated by Congress to the Mass Transit Account of the Highway Trust Fund, as well as funds in certain categories of the federal-aid highway programme that states and municipalities can transfer to transit.

Transit use and spending are highly concentrated in a small number of metropolitan areas. New York City Transit, the largest system, accounted for 30% of all US transit passenger trips and 18% of transit spending in 2002, and received 10% of all federal transit assistance. The central systems in New York City, Chicago, Los Angeles, Washington D.C. and Boston had 49% of passengers and 33% of expenditures, and received 27% of federal assistance.

Issues

Over the past 20 years, the US system of earmarked taxes has been able to fund sufficient growth in highway spending and capacity, and some improvements in service, although without being able to prevent increased highway congestion. TRB (2006) concluded that – despite projected losses in the tax base due to more fuel-efficient vehicles, higher fuel prices and environmental regulations, and some increase in the percentage of fuel tax revenues dedicated to non-highway uses – this system could continue to fund highways at a similar level for the next 15 years, based on fuel tax increases in line with historical standards. Notably, the average of all user fees paid per vehicle-mile of highway travel declined from USD 0.06 per mile in the 1960s to USD 0.03 per mile by 1980. The average fee has since recovered somewhat and is now USD 0.034 per mile (all prices in 2001 dollars).

However, the report also notes that transport users and the general public would benefit from changes in the current fee structure, progressively increasing the extent of direct charging for the use of roads. These benefits would take the form of improved operation of the network, including reductions in congestion. It would also mean that investment could be better targeted towards the most beneficial projects, in terms of those elements of the highway network best able to generate revenues. Where improved operation is concerned, direct charging could induce travellers to avoid peak periods, thereby reducing overall congestion. In terms of targeting investment, revenues generated from given elements of the road system would indicate those locations where capacity expansions would be most beneficial, would allow for construction of projects based on their ability to self-finance, and would result in increased revenues received at the local level for dedication to local needs.

The report does not see the widespread implementation of tolling as a short-term proposition, or as something that would replace fuel taxes. Indeed, it is particularly noted that, "even if tolling were applied to all roads suited to conventional tolling technology, revenue from tolls on limited-access highways and express lanes would remain a small fraction of total road spending."

The point is also made that many industries and households are "profoundly affected by the current approach to highway funding … [and a] radically new approach may be disruptive unless it is phased in gradually."

Key challenges foreseen with regard to direct user charging include gaining public acceptance, which would most likely occur over a long period of time, and be based on experience showing clear benefits over costs. Furthermore, making the transition from the current system to new sources of funding and establishing prices will also be difficult, and will require close collaboration among the

federal, state and local jurisdictions. Also, governments will need to develop new competencies to manage the financial reform associated with increased user charges.

Recent initiatives have taken steps in making this more possible. For example, the most recent legislation reauthorizing the fuel-tax-based highway funding programme – the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU) – included a provision allowing states to convert existing high-occupancy vehicle lanes on federally funded roads into high-occupancy toll lanes, and to build new tolled lanes alongside free lanes on existing expressways.

Again reflecting differences in the US context, the TRB report cautiously notes the benefits of private participation in financing schemes involving user charging. "The private sector's most valuable contribution might be in discovering good models for toll road development and operation rather than in funding." At the same time, it points out that the different incentive structures in the private sector might allow it more latitude to control costs, set prices and manage infrastructure based on financial principles, although "[t]here is no guarantee that private firms would outperform public agencies in these tasks."

It is noted that some key reforms would be necessary to increase user-charge-based funding. For example, current federal tax incentives favour government-owned and financed toll roads over those managed by the private sector.

While the US has less experience in the use of PPPs for highways than some other countries, there is obviously a growing interest in "innovative financing", which is specifically promoted in SAFETEA-LU. Furthermore, various states – notably Illinois, Oregon, Texas and Virginia – have PPP initiatives.

However, a system that is based on earmarked government revenues creates particular challenges where the use of alternative models is concerned. Perhaps as a result, the US is employing some mechanisms that are less common in other parts of the world. In particular, many of these do not involve the transfer of significant responsibilities for the tasks associated with infrastructure provision to independent entities.

The *Grant Anticipation Revenue Vehicle* (GARVEE) programme allows state governments and other public authorities to issue debt financing instruments, such as bonds, for the construction of transport infrastructure, and then repay this debt using future federal contributions. However, the reimbursement of the construction costs need occur only when the debt service is due. Thus, capital may be generated in the short term based on government lending rates, to get projects up and running without waiting for government funds to be available. At the same time, the costs of infrastructure development are spread over its life cycle, rather than just during the construction period (Mackie and Smith, 2007).

State Infrastructure Banks (SIBS) allow states to enter into co-operative agreements with the federal Secretary of Transportation to establish revolving funds capitalised by federal contributions. These could then be used by the states to attract additional private and non-federal public investment.

The *Transportation Infrastructure Finance and Innovation Act* (TIFIA) programme provides federal government credit assistance for the development of "nationally or regionally significant" surface transportation projects, including highways, rail and public transport, provided that they have their own repayment streams, such as toll roads (FHWA, 2006a). TIFIA allows the US Department of Transportation (USDOT) to provide direct credit assistance of up to 33% of project costs to sponsors of major transportation projects. This support can be in the form of loans, loan guarantees or lines of

credit. TIFIA assistance thus provides beneficiaries with improved access to capital markets, more flexible repayment terms, and better interest rates than in private capital markets (Mackie and Smith, 2007). SAFETEA-LU expanded eligibility for using the programme to include public freight rail, private facilities providing public benefit for highway users, intermodal freight facilities, access to freight facilities, and service improvements, such as intelligent transportation systems (FHWA, 2006a).

The legislation also allows certain surface transport projects already receiving federal financial assistance, including some bridges, tunnels and intermodal facilities, to issue *Private Activity Bonds* up to a maximum value of USD 15 billion. The purpose is to allow additional private investment in projects while maintaining the tax-exempt status of the bonds (Peters, 2003).

The scope of applicability of this financing – including rail, public transport and intermodal facilities – reveals that they are intended to meet public policy objectives beyond the financing of the Interstate highway system.

Conclusions

Systems for providing for infrastructure develop over time, and are highly reflective of the context in which they exist. The US model is obviously reflective of a federal system. Furthermore, from a very early stage, it has been established that there should be some link between revenues and expenditures in the road sector.

The special nature of transport financing and provision in the US has also given light to particular financing mechanisms – notably those in which the government retains control over the process but uses specific instruments, such as bonds, to finance given infrastructure. This provides an example whereby an "investment spending" approach can be taken to infrastructure without ceding control over it to a non-government entity.

1.6. New Zealand: The national land transport programme

In New Zealand, responsibility for decision-making regarding the funding of land transport infrastructure has been devolved to a public agency with an independent management board, Land Transport New Zealand (Land Transport NZ). This is an example of the Infrastructure Fund concept discussed in Chapter 5. Another government agency, Transit New Zealand (Transit NZ), is responsible for the procurement and maintenance of, and investment in road infrastructure, which it does by way of outsourcing to private organisations.

Land transport New Zealand

Land Transport NZ is a public entity formed to promote land transport sustainability and safety, and allocate government funding (see www.ltsa.govt.nz). It was established in 2004, combining the Land Transport Safety Authority and Transfund New Zealand.

Land Transport NZ is governed by a board made up of non-public officials, appointed by, and reporting to, the Minister of Transport. The Director of Land Transport NZ is appointed by the Board. Land Transport NZ has an annual performance agreement with the Minister of Transport, which outlines key initiatives and specifies performance measures for the delivery of outputs.

In terms of guiding objectives, Land Transport NZ is required to contribute to an "integrated, safe, responsive and sustainable land transport system". In meeting its objective, it is required to demonstrate a sense of social and environmental responsibility.

Transit New Zealand

Transit NZ is responsible for the country's 10 000 kilometres of national roads. Its activities are fully funded with allocations from Land Transport NZ. The organisation has no in-house resources for carrying out maintenance and other works, and its staff is of about 175 persons. Transit NZ can, in principle, levy tolls or assign concessions for road projects, but this has not yet been done.

The national land transport programme

Among its various functions, Land Transport NZ both collects revenues and funds transport infrastructure and service providers. This includes responsibility for:

- Overseeing the National Land Transport Programme (NLTP).
- Procurement procedures, policies and guidelines.
- Performance agreements with service providers for the implementation of the NLTP.

The NLTP provides a framework for road funding, including a wider set of transport objectives and specific programmes (Potter, 2007).

Land transport funding comes from road user charges, a dedicated portion of the fuel excise tax, and motor vehicle registration and licensing fees. This income goes into the *National Land Transport Fund*, a dedicated land transport fund within the government's accounts, operated by Land Transport NZ.

A small portion of the revenues is used for road policing and other uses. The remainder – making up the lion's share – goes into the National Land Transport Account, which can be used to fund national, and partially fund local roads in partnership with other levels of government. The exact sources and uses of the National Land Transport Fund and Account are detailed in Figure A.1. In recent years, land transport funding has also been supplemented by grants for specific regional projects.

More specifically, Land Transport NZ provides financial assistance to the following organisations:

- City and district councils, to jointly fund the maintenance and construction of local roads, passenger transport infrastructure, the promotion of walking and cycling, community programmes, *etc*. Land Transport NZ provides a national average of 50% financial assistance for maintenance programmes and an additional 10% for construction projects, with local rates and other local authority revenue providing the balance.
- Territorial authorities.
- Regional councils for the provision of passenger transport services; and the promotion of transport demand management and rail and sea freight. The level of financial assistance from Land Transport NZ varies, but is generally at least 50%.
- Transit New Zealand, for the state highway system, including maintenance and construction of state highways, the promotion of walking and cycling, administration and project control, etc.

- Research agencies.
- Police, for road safety enforcement and education activities.
- Local government and community groups, for road safety activities.

The New Zealand road fund is often seen as a world leader where such mechanisms are concerned. Potter (1997) noted that New Zealand's approach "perhaps" came closest to meeting the World Bank's principles for road funds, which he described as follows:

- "To influence demand and to provide a basis for linking revenues and expenditures so as to create a hard budget constraint, charging instruments should be:
  - Related to road use.
  - Easily recognisable.
  - Easy to separate from taxes and other charges.
  - Simple to administer (*e.g.*, not subject to widespread evasion, avoidance, and leakage)."

Potter (2007) also notes that New Zealand is increasingly looking to move beyond fuel taxes as the principal source of financing for roads, and to focus on more direct user charges. This includes examining future use of satellite-based charging.

1.7. Private provision of rail infrastructure in Canada

North America provides an example of the extensive private ownership and operation of railway infrastructure. Canada and the US pursue similar approaches with regard to rail investment and financing – freight rail is in private hands, funded by the users, while passenger rail is largely public, and user charges are topped up with government subsidies.

Where freight rail is concerned, Canada has close to 49 000 route kilometres of railway. Vertical separation of service and infrastructure provision is not required and is not the norm. Over 70% of the track is owned or leased by the country's two Class I railways, CN (Canadian National) and CPR (Canadian Pacific Railway) (Transport Canada, 2004).

In recent years, CN and CPR have been consistently profitable, with revenues growing at an average annual rate of 1.8% from 1998 to 2003, while annual productivity gains across the sector averaged 5.4% in the same period. Users experienced financial benefits from this, as rail freight rates fell by an average 1.7% in 2003 across the sector, and at an average annual rate of 1.4% in 1998 to 2003. Class II operators, *i.e.* the smaller-scale services, also experienced profits in the same period (Transport Canada, 2004).

In 2001, a government-commissioned independent review concluded that the system "works well for most users most of the time" (Canada Transport Act Review Panel, 2001). This is the result of specific policy decisions by government aimed at increasing the role of competition as a driving force in the transport sector. The decision was entrenched in legislation, in the form of the *National Transportation Act, 1987* and the *Canada Transportation Act, 1996*.

This legislation allowed for a fundamental transformation of the sector. To begin with, the largest Class I railway, CN, previously a state-run enterprise, was privatised in 1995, becoming a for-profit company. The 1987 legislation also allowed prices and charges for the movement of all products to be

negotiated, with the exception of grain. Sale and discontinuance provisions allowed railways to rationalise networks, offering them for sale to local service providers or shutting them down entirely. Moreover, barriers to entry were lowered. Clearly, the orientation was towards a sector that was more commercially viable, even if this meant reducing service in some parts of the country, and more subject to competition both from other rail carriers and other modes (Canada Transport Act Review Panel, 2001).

The result was a fundamental transformation of the sector. Approximately 9 800 kilometres of rail line were discontinued between 1990 and 2004, primarily by the Class I's. Also, 11 new short line (Class II) operators were established between 1990 and 1996, and 37 between 1996 and 2000 (Transport Canada, 2004). Whereas CN and CPR operated about 90% of the domestic rail network in the early 1990s, they now operate about 70%, although they continue to account for about 90% of industry activity and revenues (Transport Canada, 2004).

This process has not resulted in a cessation of government's responsibilities with regard to the sector. Indeed, regulation exists to ensure that competition is maintained, particularly with regard to ensuring access to track at market prices. Regulations deal with such issues as access rights, levels of service, competitive rates for moving goods across one railway's line to an interconnecting line, and obligations to transfer goods from one railway to another within a limited radius. An independent, quasi-judicial agency of the federal government, the Canadian Transportation Agency, deals with rate and service complaints arising in the rail industry.

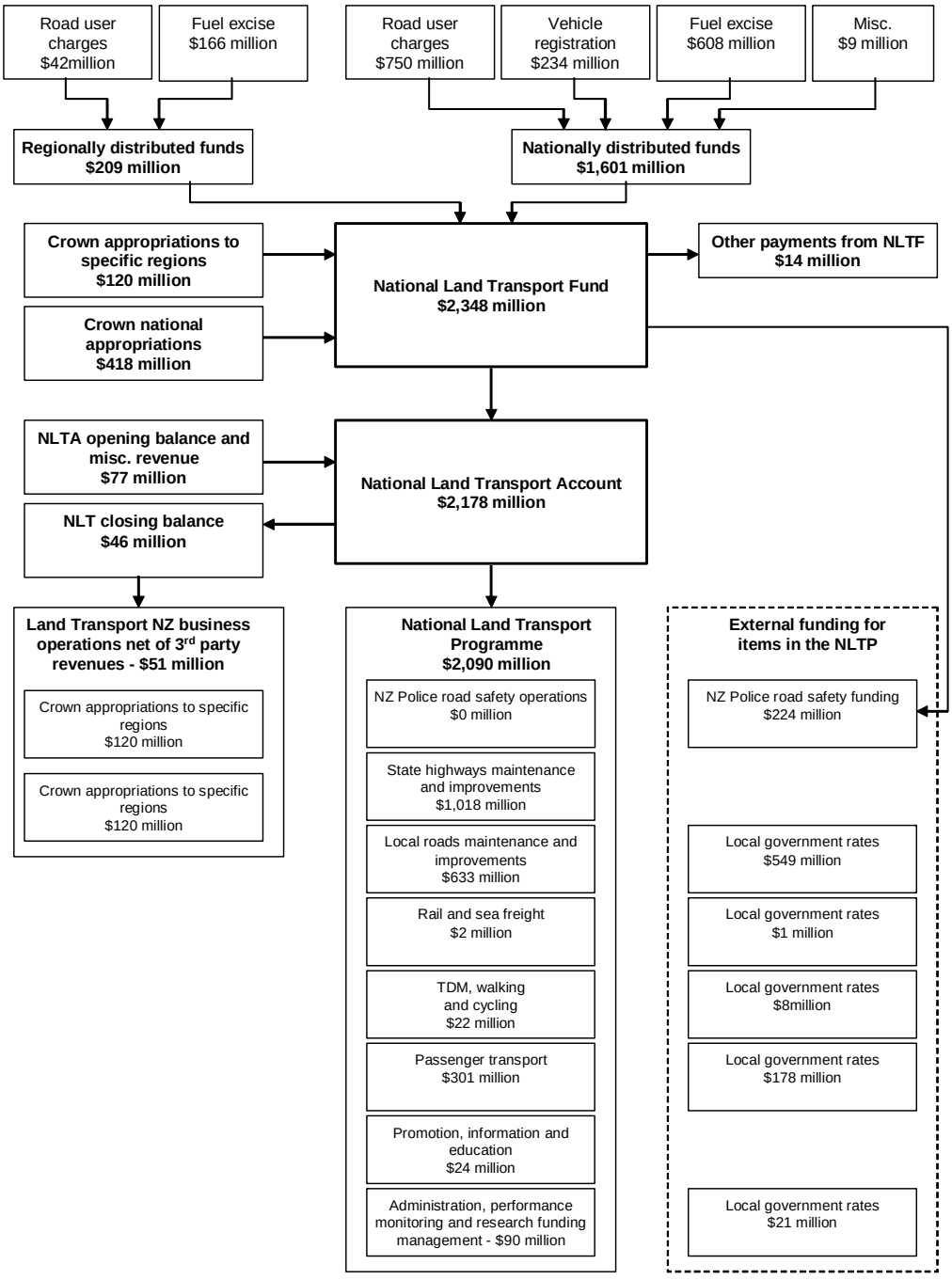
Canada's freight railway sector provides an example of a network that is supplied in a manner that is commercial in its orientation, efficient, and does not require subsidy. A similar system exists in the US, and, indeed, some integration of the overall railway network has occurred across North America by way of mergers and acquisitions. The North American example shows us that larger markets can be created by co-operation across countries.

The rail context in Canada has developed over time such that greater emphasis is placed on freight as opposed to passenger transport. This is largely the result of the expansive geography with relatively few densely populated corridors. However, it also reflects a situation in which fuel is relatively inexpensive compared to in many countries, and highway charges low. Finally, there is often no separate infrastructure for passenger rail, meaning that passenger trains mainly employ infrastructure belonging to the freight companies and used by freight trains, limiting the options for passenger operations. Passenger rail is provided by a state-run enterprise that receives an annual subsidy.

It might also be noted that the Canadian government played an essential role in the development of the railway system. The first cross-country railway was privately built but facilitated by the government in the form of direct subsidies, land, money for surveying costs, and a 20-year property tax exemption (Virtuosity Consulting, 2005). Thus, it could be argued that the current privatised system may only be possible when the network has been brought to a relatively high level of development, based on earlier government support.

Figure A.1. **Funding Sources and Uses in New Zealand**

(All amounts in NZD)



Source: *Land Transport NZ (www.landtransport.govt.nz/funding/nltp/funding.html).*

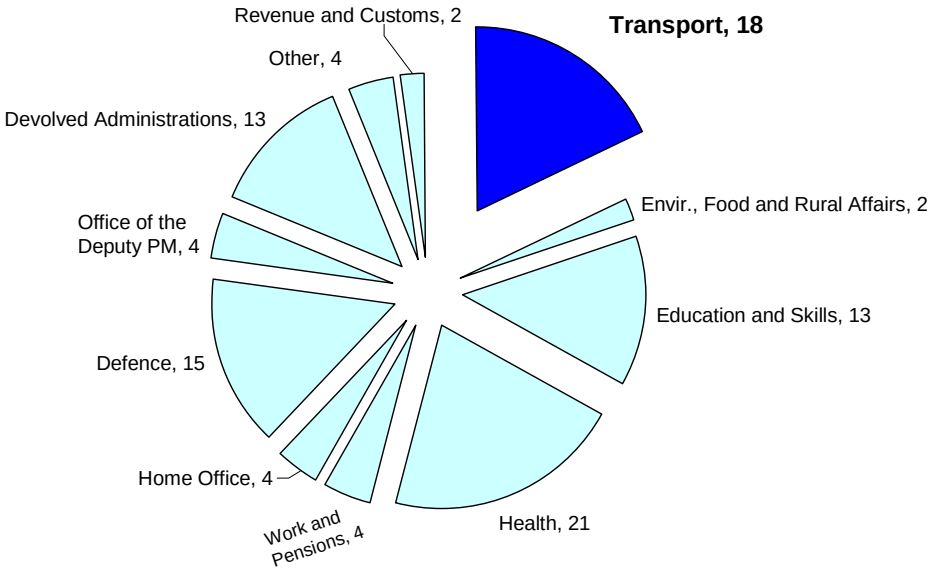
2. PROJECTS

2.1. United Kingdom: The private financing iInitiative

One of the most ambitious initiatives for private involvement in infrastructure across an economy is the UK's Private Financing Initiative (PFI). By early 2002, about 500 PFI contracts had been signed in the UK (see Mackie and Smith, 2005b, for an overall review of the PFI, as well as Spackman, 2002).

The essential features of the PFI are that capital investment projects are financed as well as constructed by a private company and then leased back to the public sector over a pre-determined period *(i.e.* 15-30 years) (Sawyer, 2005; HM Treasury, 2006b). In other words, the PFI inherently involves outsourcing the financing aspect of a project. The private company also provides a range of services associated with the capital project, such as its maintenance.

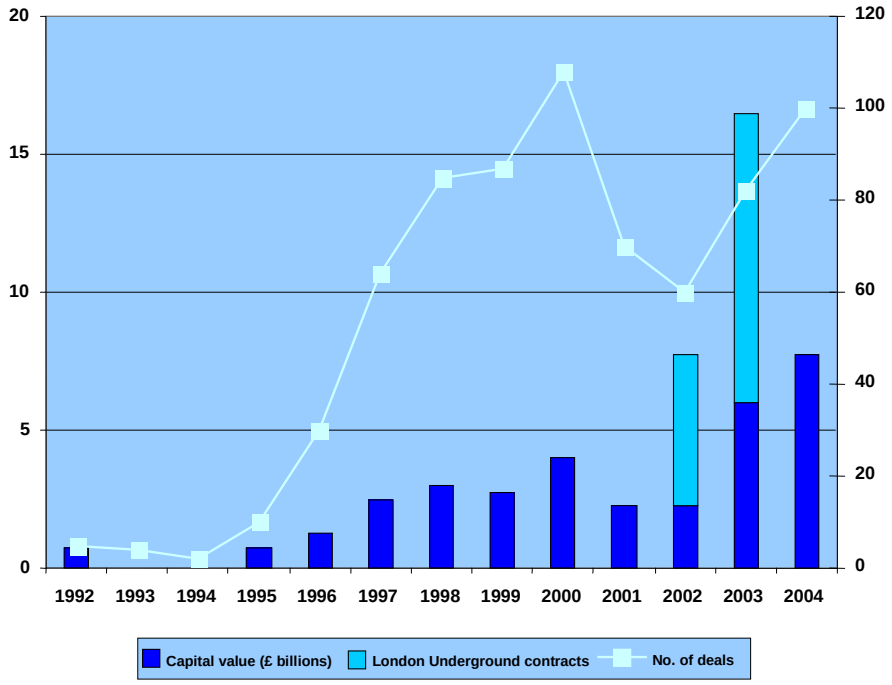
Figure A.2. **Proportion of PFI Projects by Capital Value in Different UK Government Agencies** (*i.e.* departments, ministries, etc.)



Source: Adapted from HM Treasury, 2006a.

Transport has played a key role in the PFI, as seen in Figure A.2. As of 2006, there were 43 transport projects, compared to 185 health facilities, and 230 schools (HM Treasury, 2006a). However, the values of the transport projects are typically much higher. Particularly large PFI projects have included the M6 Motorway, the London Underground upgrading, and the Channel Tunnel Rail Link (CTRL) (Estache and Serebrinsky, 2004; HM Treasury, 2003). Figure A.3 shows us the impact of one project area, the London Underground upgrading, on the overall value of PFI financing. As of 2003, transport projects accounted for 22% of the capital value of all PFI projects (HM Treasury, 2003).

Figure A.3. **Number and Value of PFI Projects by Year**



Source: *Adapted from HM Treasury, 2003.*

Note: Figures for 2003 and 2004 were projected.

As ambitious as it is, the PFI does not mean that PPPs will provide for most investment needs, nor is it intended to. For example, the PFI accounted for 11% of total investment needs in 2003/4. HM Treasury (2006a) emphasizes that the programme is intended to play a "small but important" role, including about 10-15% of total investment in public services. PFI investment in the transport sector is in keeping with this, in that many projects have been of particularly high profile or subject to high levels of usage, such as motorways, bridges and urban rail, as well as the CTRL.

Some projects have experienced difficulties. Chapter 2, for example, notes problems with the CTRL project, in which demand predictions did not materialise (see KPMG, 2005). Chapter 9 noted the Skye Bridge project, where users rejected tolls. In both instances, the government was forced to intervene, raising the overall costs to the taxpayer of the projects. Concerns with DBFO motorway projects are discussed below.

Value for money in the PFI

Central to the PFI process is the idea of making *ex ante* comparisons of proposed privately funded projects with "a conventional alternative", to ensure that the private option provides "value for money" (VFM). The obligatory use of this type of analysis was initially established as part of the "Ryrie Rules" discussed in Chapter 3, which also called for private financing to only be used to replace, and not extend, investment from public sources. Both these rules were later relaxed (Kain, 2002).

Initially, VFM analysis was carried out using the public sector comparator (PSC). PSCs are discussed in Chapter 5.

Following the National Audit Office's concerns with the use of the PSC, such as those outlined in Box 5.1, in 2003 HM Treasury outlined the need to reform the use of this tool. They noted particularly that VFM for complicated, long-lasting projects could not be determined by a simple *ex ante* comparison of single figures.

A first step in the reform process took place with the publishing, in 2003, of the *Green Book*, which established guidelines for all public sector investment project appraisals, including under of the PFI. Elements of particular relevance to the PFI were (HM Treasury, 2003):

- The establishment of 3.5% as the discount rate for determining the present value of projects. The rate of 6% had been used for many previous PFI projects.
- Separate adjustments for optimism bias and tax.
- The recommendation that appraisals be conducted with a rigour commensurate with the scale of expenditures involved and the stage of decision-making reached.
- That more emphasis should be placed on evaluating benefits and ensuring that these are actually realised.
- That more consideration be given to the wider impact of the projects on society.

With this in mind, HM Treasury produced a new *Value for Money Assessment Guidance* in 2004, and updated it in 2006, for use in PFI procurement (HM Treasury, 2006b). This Guidance sets out a 3-stage process for determining VFM. *Stage 1* involves an examination of programmes – portfolios of projects with common characteristics, overall management and objectives – that are likely to be suitable for PFI procurement. *Stage 2*, which has replaced the PSC, involves more detailed analysis of individual projects within that programme, as part of the "Outline Business Case" (OBC). Elements considered during the first two stages include the "viability", "desirability" and "achievability" of the different financing options. If the first two stages determine that there is potential for VFM, then *Stage 3* involves continuous appraisal up until financial close.

As part of these guidelines, HM Treasury (2006b) notes a series of factors that should "form part of the evidence base" for successful use of PFI in a project, including achieving VFM:

- "A major capital investment programme, requiring effective management of risks associated with construction and delivery.
- The structure of the service is appropriate, allowing the public sector to define its needs as service outputs that can be adequately contracted for in a way that ensures effective, equitable, and accountable delivery of public services into the long-term, and where risk allocation between public and private sectors can be clearly made and enforced.
- The nature of the assets and services identified as part of the PFI scheme, as well as the associated risks, are capable of being costed on a whole-of-life, long-term basis.
- The value of the project is sufficiently large to ensure that procurement costs are not disproportionate.

- The technology and other aspects of the sector are stable, and not susceptible to fast-paced change.

- Planning horizons are long-term with confidence that the assets and services provided are intended to be used over long periods into the future.

- The private sector has the expertise to deliver; there is good reason to think it will offer VFM and robust performance incentives can be put in place."

This clearly reflects wisdom obtained from earlier experience regarding what projects lend themselves to PFI-type arrangements.

The actual initial decision to use PFI or not for a given project occurs in Stage 2. The objectives employed at this stage go beyond the comparison of figures used in the PSC, including (HM Treasury, 2006b):

- "Demonstrate that the initial decision to use PFI, based on an investment programme assessment, is valid for particular project.

- Verify whether appropriate risk transfer arrangements are achievable.

- Where project specific issues emerge so that PFI is no longer likely to offer VFM, direct the procuring authority early on towards the possibility of using other procurement routes including switching to conventional procurement.

- Feed information back to the programme level to improve the evidence base and potential for market management.

- Provide improved cost estimates so that, as part of the OBC, procuring authorities can be confident that the project is affordable.

- Test whether the PFI solution has sufficient market interest.

- Help ensure an efficient bid process is planned within a realistic timeframe.

- Provide the procuring team with a framework within which they can take decisions if the assessment should suggest that the market conditions are unfavourable."

Notably, cost evaluations are only one element of this, which is a marked departure from the PSC.

As this guideline was only recently issued, it is not possible to assess its success, or compare it to the efficacy of the PSC.

DBFOs

As noted above, the PFI inherently involves the outsourcing of financing to private companies. The approach initially employed for motorway projects was the Design-Build-Finance-Operate (DBFO) model, with payment via shadow tolls. In fact, the term DBFO has become synonymous in some technical vocabulary with the shadow-toll approach.

The first DBFO projects were introduced in the early 1990s. Private consortia were invited to enter tender competitions to design, build, finance and operate new, and in some cases reconstructed, roads, and ultimately to transfer them back to government. Effectively, the winning bidder was the one that offered to take the franchise for the lowest shadow toll per unit of traffic.

An overarching argument was that, in a DBFO-type world, scrutiny by all parties is more likely to be effective. The injection of market forces should lead to better means of dealing with the various challenges associated with the provision of the asset, as opposed to a strictly bureaucratic decision-making process. Under DBFOs, post-contract specification changes would be expensive, so the risk of politically induced specification changes was thought to be reduced. Furthermore, the bidding process itself would encourage efficiencies, provided conditions for a fair auction exist.

By 2002, 14 DBFO projects had been completed in the UK, involving concession contracts governing construction works and operation and maintenance commitments for, at most, a 30-year period.

As described in Box 7.1, shadow tolls were paid based on "bands" of traffic that would require lower payments as traffic volumes increased, with the top band generating no additional return for the concessionaire. Complaints with this approach include that it effectively limits the private partner's demand risk and limits government's flexibility and control.

The UK National Audit Office examined four of the first DBFO projects in 1998 (NAO, 1998, see also Shaoul *et al.*, 2006), noting that these had been chosen by the government to test the market. It concluded that the tendering process had attracted widespread interest and maintained competitive tension, leading to the assumption that the best possible terms had been achieved by government in the final contracts. However, it also noted some concerns. To begin with, the shadow toll mechanism and private financing were seen to add to the costs of providing these roads. Also, the tendering process involved important transactions costs – such as external advisors contracted by the government – that would not otherwise have been incurred. Furthermore, the NAO thought that the discount rate used to calculate the cost of government provision of the projects for the purpose of comparison was too high (an issue discussed in Chapter 5), and means of reducing the costs of "traditional" procurement – like Design-Build methods – were not considered. Finally, the method of procuring the DBFOs left little room for innovation, and thus reduced the possibilities for savings.

A later NAO report (1999, described in Shaoul *et al.*, 2006), focusing on one motorway in particular, noted the high cost of private finance; a significant overestimation in the cost of public procurement; and that the contract provided an incentive for the contractor to complete construction early, thereby starting the flow of shadow tolls earlier than expected and increasing the overall cost of the project to government.

Edwards *et al.* (2004) found concern regarding the financial reporting by all parties and whether it sufficiently provided accountability to the public by way of transparency. They questioned the extent to which VFM could really be measured in the longer term, and noted some of the additional costs that result from PFI arrangements, such as higher interest rates, and the costs associated with monitoring implementation. They also questioned the degree of risk transfer in cases where loan guarantees were provided. Finally, they suggest that there is little detailed evidence regarding *ex ante* financial appraisal or *ex post* financial evaluation.

An *ex post* assessment of implemented projects indicated an effective cost of capital that was six percentage points above the rate paid by the Treasury. Mackie and Smith (2005b) note that the gains

of the PFI are more likely to result from efficiencies in management practices than from the financing itself.

Perhaps in response to some of these concerns, HM Treasury (2006a) recently announced planned improvements to the PFI process including:

- "Enhance the capacity of departmental Private Finance Units (PFUs) to ensure that they are appropriately resourced to provide support to procurement teams in departments and local authorities.
- Develop a secondment model to ensure that public servants with experience of complex procurements can be retained and deployed on projects across the public sector.
- Enhance individual and team procurement skills through formal training.
- Improve the maturity of projects when they go to market by requiring procuring authorities to do more work up front as part of the outline business case.
- Increase the monitoring and scrutiny of projects, changing how certain central government projects and particularly complex projects are approved, and putting in place a mechanism to identify projects which develop problems during procurement.
- Develop a best practice PFI project governance model.
- Facilitate the spread of procurement best practice to reduce procurement timescales and costs, including standardising the Government's approach to design issues across different sectors."

Furthermore, according to HM Treasury (2007), the UK's now long experience with the PFI has allowed for a refinement of certain processes, to a point where guidelines can be provided on such issues as standardisation of contracts, VFM appraisal (as discussed above) and credit guarantees.

Partnerships UK

The PFI has also involved the establishment of innovative institutional structures to guide the development of PPPs. In particular, in 2000, the government established Partnerships UK (PUK) – itself a PPP – with a view to supporting and accelerating the use of PPPs.

PUK supports individual projects throughout and after the procurement process, including by way of co-investing using financing raised from shareholders, mainly by way of loans. It also assists the government in developing policy and monitoring compliance. In all of these activities, it is assumed that PUK's private sector expertise will increase its efficacy.

Private investors hold a majority stake of 51% in PUK. However, the organisation reinvests all surpluses in the business, based on a policy of not paying any dividend to shareholders. Rather, the shareholders are considered to have invested in the development of an effective PPP market in which they can participate. Furthermore, they are also paid a fixed coupon on their loan stock.

HM Treasury also has a public sector Advisory Council to oversee PUK's work (see Partnerships UK web site, 2007).

Concluding remarks

As a concerted policy to use private resources for the provision of public services and goods, the PFI can be said to be groundbreaking. As such, it allows for the observation of the development of one form of PPP initiative over time, including responses to problems.

The PFI highlights a number of the issues discussed throughout this report, namely key elements that need to be included in PPP arrangements (Chapter 5), value for money measurement (Chapter 5), the importance of appropriate risk sharing (Chapter 6), the implications of user charging (Chapter 7), the use of special PPP units (Chapter 8), and the importance of adequate procurement and contract design (Chapter 9).

2.2. Motorway concessions in Spain

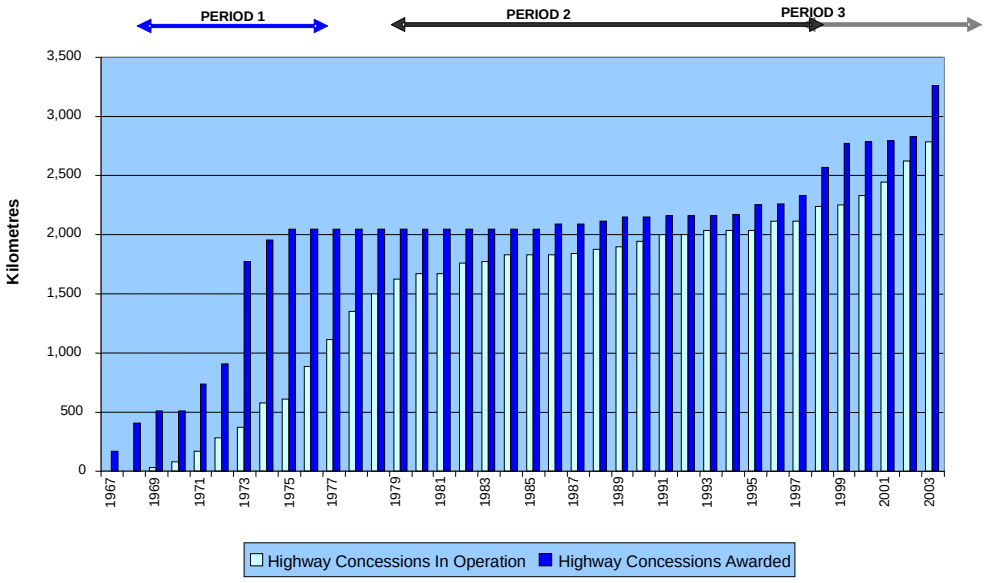
Spain provides an example of extensive outsourcing by way of the use of concessions for discrete elements of the motorway network. It also provides examples of how the use of models for road provision can alter over time, and how legislation can be enacted that seeks to establish conditions for sharing risk, for protecting the public interest by guaranteeing quality, and for dealing with renegotiation.

Since the late 1960s, more than 30 motorway concessions have been granted in Spain. In 2004, the length of the toll motorways already awarded totalled 3 257 kilometres, of which 2 788 were in operation and 470 under construction. The length of free motorways in 2004 was 10 500 kilometres. As Figure A.4 shows, the length of concessioned motorways in Spain is set to expand considerably, based on existing commitments.

Figure A.4 also shows that the expansion of the toll motorway network in Spain has taken place under three different periods:

Period 1: Between 1967 and 1975, 2 042 kilometres were granted, representing almost two-thirds of the present length of toll motorways in Spain. Toll motorway concessions were used by the government as a means of expanding and improving the Spanish motorway network during this period for two reasons. First, Spain's economic growth prompted a significant increase in traffic, so more and better roads were needed. Second, the huge investments costs were unaffordable for the public budget and private financing was seen as the only way to provide resources. Motorway concessions therefore enjoyed several advantages compared to other industries, including fiscal deductions, loan guarantees, and exchange insurance provided by the state for loans denominated in foreign currency.

Figure A.4. **Length of Motorway Concessions in Spain**



Period 2: Very few concessions were awarded between 1975 and 1995. First, the two oil crises in the 1970s destabilised the Spanish economy. Second, the political atmosphere in Spain in the late 1970s was uncertain. Third and most important, the government at that time was politically opposed to promoting private concessions as a means to finance motorways.

Instead, the government developed the so-called "Expressways Program" in order to meet the need for building the high capacity network that Spain's stable economic growth demanded. This new program was completely funded by the public sector. The government modernised the country's road network by widening and upgrading the most important roads, turning them into double-track fast lanes, but with geometric standards below those in toll motorways. Higher accident rates on the upgraded roads (*autovías*) compared to on toll motorways may partially reflect this.

Period 3: The third stage lasted from 1996 to 2004. The government's main challenge at that time was to incorporate Spain into the European single currency area, which involved a great effort towards meeting macroeconomic convergence criteria with respect to the public-sector deficit, inflation, and so on (see Chapter 8 for a discussion of EU convergence criteria). The need to contain Spain's deficit was the main reason for the new government to implement a concessioning system in order to attract private capital. This made it feasible to pursue an infrastructure investment programme without jeopardising compliance with the Maastricht criteria. From 1996 to 2004, 1 003 kilometres of motorway concessions were granted on this basis, and 755 kilometres have so far been built.

The new public works concession law in Spain

In May 2003, the Spanish parliament approved a new Concession Law (*Ley 13/2003 Reguladora del Contrato de Concesión de Obras Públicas*). The objectives were, among others, to update the old motorway concession model and extend it to every type of public works, to reinforce the contribution of private financing to constructing and maintaining public facilities, and to add a new risk-sharing approach to the legal framework (Izquierdo y Vassallo, 2004).

The law allows cross-financing for different infrastructure facilities, as long as these are functionally related to each other. For instance, it is possible to finance an airport runway with the tolls

collected from a motorway that provides access to that airport. However, it is not permitted to cross-finance an infrastructure facility that has nothing to do with the infrastructure facility that yields revenues.

Under two restrictions, it is feasible to differentiate toll levels. First, there is an upper limit for the maximum tariff that can be charged during peak hours. And second, a limit applies for the average tariff during a year. Those limits are updated every year to account for the rate of inflation, labour costs, *etc*. These restrictions are intended to reduce possibilities for abuse of the concessionaire's monopoly position.

The new law's approach regarding risk distribution in infrastructure concessions is based on the following considerations:

- The private sector should be allocated most of the market risks.
- The public sector should be allocated the risks that cannot be adequately managed by any other stakeholder.
- The public sector may assume or mitigate some risks, but this should not be done in a way that boosts Spain's public deficit. The law therefore restricts these measures to be confined to modifications of economic parameters such as prices, contract length, *etc*. Public subsidies may only be used under restrictive conditions to re-balance risk.
- Risk mitigation must be understood in a symmetrical way. If, for instance, traffic is much lower than expected, the contract may stipulate that the length of the concession can be extended to compensate the concessionaire. Similarly, if traffic is higher than expected, the contract may stipulate that the length of the concession has to be reduced.

Since infrastructure belongs to the public sector, the government retains the right to change the terms of the contract in order to make it coincide with the public interest. If this change has financial consequences for the concessionaire, initial conditions can be modified in order to compensate for it. Moreover, if the government takes some action not foreseen when the contract was signed and this substantially affects the concession, this should be dealt with by renegotiating the contract.

Changes of this nature are referred to as "substantial rupture", a concept that has not been given an operational definition. If either the public authority or the concessionaire considers that there was "substantial rupture" with consequences for the successful conclusion of the arrangement, they must try to agree on a solution. If they do not agree, the conflict can be taken to court or be handled by arbitration. Until the conflict has been solved, the concession terms will be those established by the public authority.

Risks related to *force majeure* are also the responsibility of the government. *Force majeure* is strictly defined in legislation to only include fires caused by atmospheric electricity, natural phenomena with catastrophic implications, and damages caused by war and serious alterations of the public order, and this risk is assigned to the government.

All other unforeseen and uncontrollable disruptions can be considered to be "unpredictable events", which are the responsibility of the private partner. Among "unpredictable events" are included, *inter alia*, technological changes that might impact on traffic demand. This has provoked much criticism of the law, especially by financial institutions that feel that a risk that can neither be managed by the private sector nor by insurance companies should be carried by the public sector.

The new law establishes a system for reducing traffic risk in order to avoid, to the extent possible, both future renegotiations and the commitment of public resources. To that end, the law establishes that the tendering process could be based on a bid for a bottom and a top level in terms of any variable related to the financial result – traffic, revenues, *etc*. – of the concession. If, for instance, traffic is higher than anticipated, the contract can be modified to rebalance the conditions, and vice versa for traffic that is lower than expected. An important point is also that the larger the difference between upper and lower limits – the larger the band width – the higher will be the score awarded to any bidder during the procurement process. The objective of this is to give advantage to those bidders who assume a higher risk, since the larger band width means higher traffic risk undertaken by the bidder.

Furthermore, the law allows for the provision of low-interest public support for projects that are deemed to be of high social value, but would not otherwise be financially viable, by way of "Subordinated Public Participation Loans", which effectively mitigate traffic risk transfer by basing the loan interest conditions on traffic bands. These are described in more detail in Box 6.1.

The new law moreover establishes that the construction risk should be borne by the concessionaire. It is, however, feasible for the concessionaire to transfer this risk to a construction company. In addition, as noted above, when there is a delay in work due to *force majeure* or to a cause attributable to the government granting the concession, the concessionaire is entitled to an extension in the duration of the concession.

Regarding operation and maintenance risk, the law incorporates two new features: the so-called "progress clause" and the introduction of bonuses and penalties related to the fulfilment of certain quality criteria. The "progress clause" consists of the obligation of the concessionaire to maintain and operate public works according to the technical, environmental and safety regulations that may be applicable at each moment. In turn, with the introduction of penalties and bonuses derived from quality indicators, the law intends to encourage the concessionaire to render the best possible service to society.

The progress clause was incorporated in motorway concession contracts tendered before the law was approved. In those contracts, the development of the "progress clause" stated that the concessionaire will be obliged to start using new methods, *etc.* in the same way as these are being introduced for roads and motorways operated by the public sector. In this case, the concessionaire will not have any right to claim compensation from the administration, except in the case that this measure entails substantial costs not previously contemplated.

The new Concession Law also provides for processes to reduce the overall costs of the tendering process by demanding highly detailed initial bid documents from competitors, which reduce the need for further negotiation. This is described in more detail in Chapter 10.

The Spanish example highlights a number of issues discussed in this report. To begin with, it shows how a country can seek to provide a key part of its overall road transport system by way of PPPs, and how these models can be refined over time. It also reveals how a specific legislative framework can be created to support this process, and how different types of risk – including demand risk – can be apportioned between the public and private partners.

2.3. The German A and F-models

In Germany, two different PPP models have been developed for road and related infrastructure: the A and F-Models. Both have in common the transfer to a private partner of responsibility for the planning, construction, financing and operation of road stretches over a long period of the assets' life

cycles, along with the transfer of the risks associated with these tasks. These models provide an interesting case study with regard to the potential impact of pricing policy, how a government might put in place legislation and tendering processes to create a PPP scheme, and institutional organisation within the government itself.

These models differ only in the way in which the private partner is remunerated. Both are user-financed PPP models that transfer traffic-related revenue risks to the private partner. However, whereas the private partner is paid by the public authority (from income from the heavy goods vehicle toll on the same infrastructure) in the A-Model approach, in the F-Model, the private partner is remunerated by toll income from all vehicles and users on the stretch for which it is responsible. The A-Model is sometimes mistaken for a shadow toll, but this is not correct as it is funded by an actual charge levied for using the Autobahn. The toll is collected by the private company "Toll Collect" (a PPP project in its own right) on behalf of the government.

The F-Model was established in 1994 with the "Federal Road Construction Private Financing Act". It is comparable to the BOT concession model used in other European countries. To handle debt service and operation costs, the private partner is entitled to levy charges, such as tolls, from all users of the facility. In addition, the private partner can receive up-front payments from the public authority.

The 1994 act was necessary to provide private partners with the legal right to charge users. Based on a previous EU directive, the law moreover restricts the F-Model to specific links, such as tunnels or bridges. The A-Model, developed in 2002, is only applicable for the extension and upgrading of existing road sections within the federal highways network (Autobahn), and the operation of such sections afterwards.

The A-Model design means that the private partner does not have to pay for registration, payment and enforcement costs. Nevertheless the concessionaire keeps the full traffic volume risk, in that it is paid based on the number of trucks using the particular stretch of road. Since users are not directly charged by the concessionaire, the A-Model itself does not need a federal law. The private partner can also receive, besides the income of the HGV toll, up-front payments from the public authority during the construction phase, but not for more than 50% of the investment costs. Currently, four such projects are tendered.

Milestones in the development of these models

The development of both the F and A-Models was a long process, the first milestone being the 1994 act. The purpose with this act was, more generally, to encourage the private sector to invest in the provision of infrastructure within the federal road network. In addition, the act allows for the transfer of the construction, maintenance, operation and financing of these tasks to the private partner.

While the act gives the private partner the right to levy user charges on the road, toll levels are set by the public authority. The way in which charges are calculated is also detailed. In particular, the principal has to consider the private partner's investment and operation costs, and profits.

A second important political step in the development of German PPPs occurred with the foundation of an "Inter-ministerial Working Group – Private Finance Infrastructure" in 2001 and the establishment of the Federal PPP Competence Centre in 2002. This was followed by the constitution of a PPP Steering Committee, which in 2002/03 published the "Federal Report on PPPs in Public Real Estate" (Pricewaterhouse Coopers *et al.*, 2003). This report described the main obstacles and barriers for PPPs in Germany at that time and gave recommendations for overcoming them. In addition, it defined the PPP procurement process as well as the methodology and tools used for their implementation, with a focus on real estate. It gave recommendations for the establishment and

organisation of the Federal PPP Task Force, which was founded in 2004, attached to the Federal Ministry of Transport, Building and Urban Development (Alfen and Leupold, 2006b). This Task Force has been set up, and its areas of responsibility are pilot project support, fundamental and co-ordination work, public relations and knowledge transfer (see www.ppp-bund.de/home.htm).

At the state (Länder) level, a first PPP Task Force was founded in North Rhine Westphalia (NRW) in 2001. Its objectives are the initiation of a standardisation process, and the development of guidelines for supporting project executing authorities in identifying, developing and implementing PPP projects. Since then, many other PPP competency centres have been created at the state level.

Another major milestone was the "Autobahnmautgesetz" act, enabling tolling for the use of the Autobahn, which was enacted in 2002. This act regulates the charging of tolls on heavy goods vehicles on the federal trunk road network, and was thus the basis for the A-Model. The corresponding "Mauthöhenverordung" regulation was enacted later in 2003 and defines HGV toll levels depending on the numbers of axes and the pollutant category.

In 2003, a law for the establishment of the Transport Infrastructure Financing Company (VIFG) was passed, establishing the VIFG as a limited liability company under the ownership of the federal government. The act authorises the VIFG to finance the construction, extension, maintenance and operation of the federal trunk road and waterways networks, on behalf of the government. In addition, the company is also responsible for the financing of construction and extension works within the federal railways network operated by the Deutsche Bahn. The VIFG also took over certain tasks in relation to the preparation and realisation of projects based on the F-Model and corresponding privately financed projects within the transport sector. Thus, the VIFG can be regarded as a PPP Competence Centre for road infrastructure projects at the federal level. In order to fulfil these tasks, the VIFG receives income from the HGV toll and waterway charges.

In 2003, Germany's Social Democrat Party (SPD) founded a PPP working group, which prepared the "PPP Acceleration Law", enacted in August 2005. It contains regulations to remove the obstacles and barriers identified in the Federal Report on PPPs, focussing on the general legal, institutional and organisational framework.

After the federal election in 2005, the new German government referred to PPPs in its coalition agreement as an alternative procurement method of increasing importance that is expected to be applied to up to 15% of overall public procurement. Subsequently, the "PPP-Simplification Law" was prepared, which is expected to be approved by the federal parliament in 2007.

During these years, several feasibility studies were carried out for pilot projects based on the A and F-Models. Furthermore, some guidelines – such as a guideline for a structured tendering procedure and a guideline for feasibility studies and value for money assessments – are in development or have been published (see Alfen Consult GmbH *et al.*, 2006).

Only two road infrastructure PPP projects have been realised to date, based on the F-Model. As of December 1999, construction works were started for the first PPP road project, the "Warnow-Crossing" in Rostock, which was opened to traffic in September 2003. Construction works for the second PPP project, the "Herrentunnel" near to Lübeck, started in October 2001, and it was operational by the end of 2005. Both projects were designed for a concession period of 30 years; however, because of the low traffic volumes in the first year of operation, these periods were prolonged. Currently, four pilot-projects based on the A-Model are also in the tendering process.

Experience: the Warnow tunnel

Costs and responsibilities

A project company, Warnowquerung GmbH and Co. KG — made up of international private partners – was given the task of developing, building, maintaining and financing the Warnow Crossing project for 30 years, after which it will be handed over to the City of Rostock.

The contract includes several clauses detailing the way in which construction risk would be managed:

- The contract could be repurchased by the city after 10 years, with the repurchase price based on expected future earnings. However, the city would be obliged not to transfer control to some other enterprise.

- The concessionaire was entitled to terminate the contract if it had not acquired a construction permit within five years after the contract was signed. If so, costs incurred – to a maximum of EUR 10 million – would be paid by the city.

- The concessionaire was also entitled to terminate the contract if the construction permit generated additional costs of more than 10%. Alternatively, the city could compensate the concessionaire for any such extra costs.

- The private partner had to accept the construction risk, again with important exceptions, namely:
  - The city would pay costs for the removal of any ammunition found during construction.
  - The partners would share any extra costs incurred due to contaminated land or *force majeure*. Alternatively, higher-than-expected costs due to *force majeure* could be dealt with by extending the contract to more than 30 years.
  - The concessionaire had to shoulder the full remaining demand risk. For instance, the city gave no guarantees with respect to traffic demand forecasts. Moreover, the City of Rostock has given no promises not to build competing infrastructure during the concessioning period.

Construction costs and financing

The original cost estimate of EUR 220 million was mainly correct, except for some cost overruns due to the excavation and disposal of waste found below ground. Financing was arranged along the lines indicated by Table A.4.

Table A.4. **Financing**

Source	M€	Observations
EU (TEN) grants	20	
Other public grants	10	Mainly for access roads
Consortium risk capital	40	
Bank loans	150	
Total	220	

Toll rates and traffic

Toll rates are regulated through regional and federal legislation. Tolls in 2006 ranged from EUR 2 for cars (EUR 2.50 in summer) to EUR 14 for a heavy vehicle (EUR 17.50 in summer).

Approximately 15 000-20 000 vehicles per day were forecast with the present toll levels. During 2006, the average daily traffic was 9 900 vehicles per day and only 15 600 at peak times (Herrmann, 2007). Possible reasons for the lower-than-expected traffic levels include:

- Changes in the local economy.
- Users are unwilling to pay tolls at these levels.
- Alternative routes are still attractive. With this in mind, there has been some discussion of changing traffic regulation in central Rostock to direct traffic towards the tunnel (from *Spiegel*, 15 June 2006).

There are several alternatives to the tunnel, and their competitive position depends on the start and end points of the trip. One alternative passes through central Rostock. This route is often congested but is free of charge. Another alternative is to use a ferry across the Warnow River at Warnemünde; ferries run every 20 minutes, and the car fare is EUR 2.80. For long distance traffic, the east-west A20 motorway runs south of Rostock, while the north-south A19 leads straight into the port area.

Legislation and political aspects

When the original contract for the project was signed, the idea was to establish the rate structure based on a financial perspective, seen from the point of view of the consortium. The purpose was, therefore, to start with a low charge and let the level increase over time. This would skew debt retirement and profitability towards the end of the concession period.

Shortly before the opening to traffic, new legislation changed the prerequisites for the arrangements. In particular, the idea of adapting the price to traffic volume, *i.e.* to let the charge rise over time, was in conflict with a basic feature of this new law, namely that charges would be based on average costs and, in particular, a linear depreciation schedule would be used. In addition, under the new law, charges can be revised every third year at most, and all users should be treated equally. Taken together, this new legislation means that neither the consortium nor the City of Rostock has the ultimate control over the level of user charges. This makes it difficult to optimise the rate structure in order to account for the consequences for the price level of use of the facility.

Prolongation of the contract

The below-forecast vehicle flow led to a crisis for the consortium in early 2006. According to *Spiegel* (15 June 2006) the consortium owners have written off EUR 40 million as losses and the banks have agreed to a longer payback time, which was made possible by a prolongation of the contract to 2053, agreed by the City of Rostock's Council (cited in *Auto-motor-und-sport* web news 16 June 2006).

Naturally, the prolongation decision caused intense political discussions. According to current legislation, the city would not be able to charge vehicle tolls, and the costs would therefore have to be covered by taxes, which could mean cuts in other sectors.

Conclusions

The German example underscores the complexity of PPP arrangements, including the institutional elements that must be in place to make them function, as well as the many factors that can come into play in determining their success.

2.4. Hungary: The M1/M15 Project

Hungary's early experiments with motorway PPPs underscore the need for realistic assumptions regarding demand and the public's willingness to pay user charges, noting that the two are inter-related. They also highlight some of the concerns related to the transfer of traffic risk to private partners, and reveal the importance of having processes in place for renegotiation to deal with unforeseen circumstances. Furthermore, Hungary's experiences provide lessons for transition countries with less financing available from public sources, lower GDP per capita, and weaker local capital markets.

When Hungary opened its borders to the west in 1989, it required a good motorway link with Austria and, thus, the completion of the M1 Motorway between Budapest and the border became a high priority. Given Hungary's high state debt, a number of studies were undertaken to analyse whether a private concession structure would be a viable solution. The results indicated that the M1 project could be developed as a 100% private finance solution and that there would be sufficient interest to create a competitive international tender. As a result, the government decided in 1991 to introduce legislation for constructing toll motorways by way of concessions, to create a specific office within the Ministry of Transport to deal with concessions, and to launch an ambitious program of motorway construction, starting with the missing section of the M1 motorway.

By the end of 1991, financial and legal advisors to the ministry were appointed and a pre-qualification procedure was started, leading to four international groups being invited to submit bids in August 1992. Of those four, two groups were invited to negotiate the concession contract in parallel, and the results were formalised in the submission of improved bids in January 1993. On the basis of these bids, and taking into account the construction price, the toll rate and the proposed financing package, including the commitment to provide equity, one group was nominated as the preferred bidder. Negotiations concluded in April 1993 with the signing of the concession contract.

The draft contract prepared by the ministry's advisors offered a good basis for negotiating. As the construction of the remaining sections of the M1 did not pose specific technical problems (*i.e.* no big structures required, flat land with little ground risk, no particular archaeological risk, and no specific environmental issues), the contractor was able to broadly accept these risks and offer a turnkey, lump sum and fixed price for the construction works.

The M1/M15 highway project was wholly funded by the private sector (80% debt and 20% equity). The acceptance by the private sector of the full traffic risk was driven by a combination of tender requirements, competition (*i.e.* showing low projections would mean losing the tender) and the relatively high traffic flows indicated by various studies.

The private sector agreed to accept this traffic risk provided that it would be free to set the toll rate, which was translated into fixing the initial maximum toll rate within the concession contract and allowing for increases in this rate on the basis of a particular formula that took into account Hungarian inflation and the devaluation of the exchange rate between the Hungarian forint (HUF) and the currencies in which the project would be financed. The initial toll rate was determined on the basis of the revenue maximisation principle. Given the high level of foreign and occasional traffic and the existence of only one toll barrier between the border and Budapest, traffic studies indicated that a relatively high toll could be charged.

As the traffic projections indicated high growth during the early years of operation, the development of a viable financing structure depended on finding the right combination of an equity/debt structure and loan maturity, while achieving acceptable annual and loan life coverage ratios. Moreover, as the revenue would be in Hungarian forints, funding in forints would reduce foreign exchange risks. Given the financial market for and in Hungary at the time, these goals were very ambitious. Nevertheless, the participation of the European Bank for Reconstruction and Development (EBRD) in the financing made it possible to raise foreign financing with a loan maturity of over 14 years (a first in modern Hungary) and to raise a significant amount in local financing with a similar loan maturity.

The EBRD played a crucial role in raising the necessary financing, as it provided lenders and investors with reassurance that the Hungarian government would not turn against the project once the construction works had been completed, and that the project would benefit from a significant cash flow to repay its debt and provide the investors with an adequate return. Although the cost of bringing in the EBRD in financial terms was significant, without it, it would not have been possible to reach financial closure six months after the signing of the concession contract.

Having initiated the M1/M15 project successfully, the Ministry started tenders for other motorway projects in Hungary: M5, M3 and M7. Studies showed that none of these projects could be financed 100% by the private sector, mostly due to the lack of foreign users. As a result, there was a perceived need to ensure financial participation by the government, with the result that the M5 project took much longer to bring on stream, and the tender offers for both the M3 and M7 projects were never fully analysed (see KPMG, 2005, for a discussion of the M5 project).

The M1/M15 project was intended to create significant benefits to the Hungarian taxpayer, and did so in some important respects:

- The construction was completed on time and within budget.
- Its operation and maintenance during the short period thereafter were effective and of the highest standard.
- During the critical economic period following its opening to the west, Hungary benefited from the M1 while not contributing to its financing.

However, opposition to private concessions gathered strength following the opening of the M1 in 1996, when it became clear that all traffic projections prepared by the ministry, investors and lenders

had been far too optimistic. Traffic at opening and traffic growth during the first three years were substantially below expectations, making it impossible to service debt. Moreover, the toll rate appeared to be the highest in Europe per kilometre travelled, and led to the accusation that the concessionaire was abusing its dominant position at the expense of the Hungarian users, resulting in a court case against the concessionaire.

In December 1996, the EBRD, as security agent, realising that the financial case for this project as a private venture no longer existed, declared a potential default and threatened cessation of construction works on the M15. It expected that the concession contract would provide sufficient grounds to threaten the termination of the contract and thus force all parties to the table to renegotiate the deal. In 1997, the ministry agreed to support the project for an interim period by issuing a letter of credit, and the investors also provided a letter of credit.

The EBRD negotiated an arrangement with the ministry for taking on the larger part of the debt through substitution for the concessionaire. Several factors facilitated this: One was the election of a new government, which opposed tolls and other PPP solutions; adverse decisions by the courts were a second; and the realisation within the EBRD that the concession contract did not provide any protection in an environment where the government opposes PPPs was the third. For various reasons (*e.g.* outstanding debt as a result of drawing the letter of credit, outstanding construction payments, ongoing operating and maintenance activities) the investors agreed to this substitution – which could otherwise not have been implemented under Hungarian law – and to the transfer of the concession to a public sector special purpose vehicle.

The M1/M15 project provides an example of how charges affect traffic flows. From 1 December 1999, the toll between Győr and Hegyeshalom was reduced to 750 Ft, instead of the previous 1 600 and 1 800 Ft. The result was an increase in traffic from around 4 500-5 500 vehicle units per day to around 6 000-7 000 vehicle units per day. Also, because of the lower toll, the traffic did not decrease in September and October, as it had in previous years.

The M1/M15 project also suffered losses because of high interest rates. The situation was made worse by the fact that the time saving was limited compared to the old road. At the same time, the toll cost of a round trip was above 15% of the monthly minimal wage.

The ministry brought this vital piece of infrastructure into Hungarian hands while accepting only a part of the debt at very favourable conditions and could now reduce the toll rates (or even replace them with a vignette). Certainly, tolls were reduced (and abolished), but this meant that significant income from foreign sources was lost. Moreover, taking on the M1 debt meant that the motorway construction budget for at least one year was completely exhausted. International funding sources then dried up, impacting on other projects, such as the M5.

The M1/M15 experience shows that even initially successful projects can quickly come up against problems if not adequately designed in keeping with the local context.

2.5. Road concessions in Latin America and, specifically, Argentina

Engel *et al.* (2003) have written about the experience with PPPs in Latin America. The following is largely based on that work, as well as other sources, such as Guasch (2004).

BOT motorway projects in Latin America reveal that initiatives that provide valuable infrastructure can potentially do so at costs that are higher than would have been incurred under fully public schemes. Of particular importance in this case are close attention to detail in developing the

project itself, ongoing political commitment, strong oversight, well conceived renegotiation plans, and the appropriate allocation of risk.

Economic crises in 1980s resulted in low investment in road infrastructure and inadequate maintenance throughout Latin America. In response, a major transformation in the way highways were provided took place in the 1990s, when more than fifty projects were undertaken using BOT contracts, mainly in Argentina, Brazil, Chile, Colombia and Mexico (see Mexico case study in Section A.2.6, and discussion of Chile in Chapter 6).

According to Engel *et al.* (2003), the promised benefits of highway concessioning in much of Latin America failed to materialise. The main reason was the continuous renegotiation of contracts. Such renegotiations can negate the public benefits of private highways by giving an advantage to firms with political connections, limiting the risk of losses and reducing the incentives to be effective and cautious in assessing project profitability.

Engel *et al.* note that opportunistic renegotiations were facilitated by two design flaws that are present in all the programmes examined. To begin with, countries seem to have pursued a "privatise now, regulate later" approach. In general, a lack of clear contractual structures resulted in cost overruns and renegotiations. Furthermore, the same government agencies both promoted and oversaw contracts. Thus, as the agencies' performance was measured in terms of projects built, they were less rigorous with regard to enforcing contract compliance.

Secondly, contracts were awarded on a fixed-price basis. Thus, the concessionaires assumed high levels of demand risk, which resulted in considerable pressure for subsidies and guarantees when expected demand did not materialise. In addition, as noted in Chapter 6, demand risk for highways is particularly fickle. Engel *et al.* suggest that governments facing an urgent need to build "socially desirable" infrastructure might be inclined to employ BOT arrangements, even though they are aware that contracts will probably need to be renegotiated and that the private partner will have a strong bargaining position at that point.

More generally, Engel *et al.* argue that the highway concessions studies were not well designed. Thus, PPPs will not represent a better option than the public provision of highways without significant improvements, such as introducing variable terms, imposing credible hard budget constraints on concessionaires, and establishing independent regulatory and supervisory bodies.

To provide a specific example, the Argentine programme began in 1990 when the government auctioned twelve twelve-year intercity concessions. Traffic levels on these roads were considered high enough (2 000-2 500 vehicles per day) to support private involvement in maintenance, rehabilitation and upgrading, but not the building of new roads. Tolls were established on a uniform basis for all concessions, based on the distance and type of vehicle. Toll revenues were not guaranteed and there was no profit-sharing mechanism. Furthermore, tolls were indexed to inflation, which protected the concessionaires.

An index was established for measuring service quality, and this was intended to improve throughout the life of the projects. Furthermore, large investment requirements were identified, and the project agreements specified that the concessionaires should undertake these *before* collecting tolls.

More than a hundred bids were received in the simultaneous auction of twelve projects during the first round of tendering. At that stage, a key variable was the rent (or *canon*) that would be paid to the government. In total, USD 890 million a year was bid for these *canones* in 1990 dollars.

The first renegotiation came after only five months. The primary reason was a new policy of peso-dollar convertibility, which banned indexing provisions in contracts. Also, several concessionaires were collecting tolls before performing the required investments. As a result of the renegotiation, tolls were reduced by 50% and the *canon* was eliminated. This meant that, instead of receiving rents, the government granted subsidies totalling USD 57 million a year to the firms.

The second round of renegotiations began in 1995, as a result of higher-than-expected traffic, which led to congestion and a need for new investments. The government threatened to force the concessionaires to accept project term extensions in exchange for the required investment. As a result of the renegotiations the projects were said to become extremely profitable, at least until 1998, with rates of return between 26% and 38%. Even so, at least USD 900 million worth of the improvements agreed to in the 1995 renegotiations were not carried out before the projects ended in 2003. However, one reason for this was that the government did not make all the payments agreed to in the previous renegotiation.

A further renegotiation took place in December 2003. The resulting renegotiated contracts specified further government grants to the concessionaires, primarily because previous grants had not been paid. In exchange, the private partners agreed to additional investments, but, again, the grants were not paid consistently. The new contracts also limited profit rates by using a trigger clause; after the target profit rate was reached, the concessionaire would have to reduce tolls or undertake additional investments. Given that these investments were not auctioned competitively, concessionaires – which often included construction firms – chose to undertake the additional investments so as to keep the extra revenue within the firm rather than to share profits with the government.

Based on the experiences from the first round of concessioning, the government set more stringent rules in the second round, which involved Buenos Aires access roads. In that case, projects were awarded to the bidder that asked for the lowest toll; terms were set to 22 years, and the contracts were generally comprehensive and included no guarantees. The number of bidders was small, with at most two per project. Furthermore, as in the first-round, the trigger clause meant that contracts were amended frequently.

The quality of Argentina's roads clearly improved as a result of concessioning and, in the period 1991 to 1998, intercity traffic increased from 73 million to 106 million traffic equivalent units.

But the cost was high. Toll revenues were approximately USD 300 million a year, with an additional promised USD 75 million in grants from the central government. This is a considerable amount of money given that the projects encompass only 821 kilometres of two-lane highways. In comparison, the public budget for road expenditures was only around USD 500 million, of which 35% went to pay interest. The four Buenos Aires access routes, in turn, involved investments of USD 1.7 billion and revenues that also came to USD 300 million.

The Argentine experience reveals the importance of the details in PPP contracts with regard to the potential social costs of the resulting arrangements. For example, because the location of the toll booths was not specified, the concessionaire was able to place them strategically so as to maximise revenue by charging relatively high tolls to users of small sections of the highway. The average cost per kilometre travelled was thus much higher than the established rate of approximately USD 1.50 per kilometre, because the average trip was short but still required payment of the full toll.

The reported operating costs of the interurban PPPs ranged between 45% and 60% (net of VAT). An estimated 40% of expenditures is for administration and collection, and, of this, more than

two-thirds is for collecting tolls. In fact, 21% of gross toll revenues is spent on administration and collection, which is as much as is spent on maintenance. One possible explanation for these costs is that many intercity roads have low traffic densities, which means that collecting tolls can be expensive. However, another explanation is that profits have been diverted to delay the application of the trigger clause. This would be consistent with the large gap noted between the profit rate estimates of the association of concessionaires (12.4%) and independent estimates as indicated above (26-38%).

The Argentine concessions programme was successful in providing a major upgrade in the country's highway network. However, this has been expensive. In particular, initial contracts that were poorly conceived and implemented resulted in expensive renegotiations, the costs of which were borne by users and taxpayers.

2.6. Motorway PPPs in Mexico

Mexico experienced a well known failure of its toll motorway programme in the early 1990s. The reasons for, and response to this provide interesting lessons with regard to the application of PPPs. In particular, since that time, a number of improvements have occurred in tendering processes and project design.

The Mexican road system

The Mexican roadway network is comprised of nearly 350 000 kilometres. Fourteen percent is administered by the federal government, of which 36 000 kilometres form part of the main trunk network, while 11 000 kilometres are regional trunk roads. Over 6 000 kilometres are toll roads.

Mexico's population settlement pattern – involving great differences in population density between different states – and its resultant economic geography create a challenge for road construction and maintenance. Whereas access to the largest cities creates problems due to traffic jams, pollution and accidents, there are still many rural settlements that are not connected to a roadway and others do not have direct access to a paved road. In general, growing transport demand, congestion problems, and better road network coverage are priority issues, as well as improving intermodal links.

Early PPP experience

From 1989 to 1994, the Mexican government authorised 52 motorway concessions, covering a total of 5 000 kilometres. The programme required about USD 13 billion, and was financed through local banks (50%), concessionaires (30%) and public guarantees and contributions (20%).

This programme ran into difficulties following a major currency devaluation in 1994. As a result, the government took over 40% of the concessions, and a new public entity was created to take responsibility for outstanding related bank credits, which added up to about USD 5 billion. Shareholders were not compensated, and are estimated to have lost about USD 3 billion. Toll rates were lowered with a view to attracting traffic. For the remaining 32 projects, the concession periods were extended to allow private partners to recover their original investments (Standard & Poor's, 2006).

Although the devaluation was a major catalyst, the failure of the programme has been ascribed to the following elements (Standard & Poor's, 2006), many of which are inter-related:

- Short concession periods of, on average, 10 years generated significant pressure on concessionaires to recover costs and pay back debts over a fairly limited period of time, leading to toll levels above what users were willing to pay and, consequently, demand levels

far below what had been projected. Indeed, the lowest concession period was a key criterion for selecting successful bidders.

- Furthermore, although demand risk was transferred to the concessionaires, the process for adjusting toll rates was complicated, and required government approval, which may have led the companies to set high initial rates for fear of not being able to raise these later.

- In the worst instances, demand levels were at 15% to 25% of projections, implying that unrealistic demand projections were also a problem. In addition, maintenance costs also proved to be higher than expected, possibly suggesting opportunistic initial projections.

- Some of the rules and procedures related to the tendering process have been criticised for a lack of clarity and transparency. In addition, competition was limited to national companies only. As a result, the projects did not benefit from the full degree of experience in managing all aspects – especially financial elements – of toll motorways, that might otherwise have been possible.

- Short timeframes for the presentation of bids also meant that the government had little opportunity to fully assess the resilience of the financial models employed.

- Projects experienced important cost over-runs. To some extent, this was due to problems in the project preparation cycle, including the fact that concessions were authorised before the government had obtained all approvals and rights of way, leading to major delays.

- The financial structure of the projects was vulnerable, inasmuch as they were subject to major exchange rate risk.

Some of the above can be directly related to the currency crisis – the devaluation impacted on real incomes, thereby affecting demand for toll roads. In other instances, these factors may have made the scheme more vulnerable to the crisis.

Although the programme experienced major problems, it was also seen to result in the creation of important infrastructure, as well as to establish in Mexico a tradition of employing tolls on key routes (Standard & Poor's, 2006)

Subsequent reforms

Building on the lessons from the earlier programme, the Mexican government has instituted the following reforms, *inter alia*, regarding the use of PPPs, which are employed in more recent projects (Standard & Poor's, 2006):

- Short concession periods are no longer a criterion for the choice of winning bidder. Rather, these are selected based on legal, economic and technical conditions, and on the lowest required subsidy.

- More detailed information is provided to bidders and over a longer time period.

- The process for modifying toll rates has been simplified and systematised, with more flexibility accorded to the concessionaire, while a "maximum average tariff" that cannot be surpassed is developed for each vehicle, with a view to preventing unaffordable rates.

- Tendering processes require more high quality demand and financial projections as part of any bid.
- Greater emphasis has been placed on ensuring the participation of national and international participants with a wide range of expertise in any tendering process.
- Fixed-price contracts are employed to limit cost overruns.
- All approvals of rights of way are obtained in advance of the project.
- Oversight of the construction is carried out by three parties: one named by the Ministry of Communications and Transportation, one by the technical committee of the state infrastructure trust fund, and one by the concessionaire itself.

Standard & Poor's (2006) suggests that the lessons of the past have provided for important improvements in practices, with the result that projects under the current programme generally benefit from a high credit rating.

Recent developments

In its 2001-2006 National Development Plan, the Mexican government emphasized the need to develop and conserve the federal highway system, with a view to supporting overall economic competitiveness. It also recognised the government's financial limitations, and thus the need to employ innovative financing mechanisms to alleviate pressure on the public budget. The central idea was to increase road investments without diverting public funds, and also to improve the quality of service to users by employing private sector expertise.

With this in mind, two different new financial models have been identified for the use of PPPs:

1. The "New Concessions" scheme: Toll-based BOT concessions.
2. The "Service Provision Projects" scheme (PPS, for its Spanish acronym): PPPs based on a combination of availability payments and shadow tolls.

Where the *New Concessions* scheme is concerned, the government recognises the potential need for public financial participation in some projects, and thus allows for such involvement by way of the Infrastructure Investment Fund (FINFRA, by its Spanish acronym). FINFRA aims its efforts at projects that face financing problems because of their size, maturity, or risk, or those whose private profitability is very small, but which offer high social benefits. However, the choice of concessionaire takes into consideration which bidder requests the lowest amount of FINFRA support.

According to FINFRA rules, there can be two types of fund participation: risk capital and subordinated capital. Risk capital refers to FINFRA's participation with private investors as a minor partner on the project, by the contribution of capital, expecting financial profitability from its investment. FINFRA also provides subordinated capital to cover debt service during the credit life, reducing the total resources required, without demanding any financial profitability. The sum of the risk capital and subordinated capital cannot exceed 49% of the project's total investment.

In these projects efforts have been made to clearly foresee and mitigate different elements of project risk, as outlined in Table A.5.

Table A.5. **Means of Mitigating Specific Risks under Mexico's "New Concessions" Scheme**

Risk	Measure
Availability of rights of way	The transport ministry undertakes to ensure that all processes are carried out to secure rights of way before any work is begun.
Cost overruns	The concessionaire must provide a guarantee in the form of a deposit of 17% of the costs of completing construction.
Construction delays due to the concessionaire	The concessionaire must provide a deposit of 3% of the construction costs.
Construction delays due to the public partner or *force majeure*	The transport ministry will maintain a contingency fund to cover such costs. However, the private partner is also obliged to carry insurance against natural disasters and other *force majeure* risks.
Cost overruns in operation and maintenance (operating risk)	These must be covered by the private partner.
Financial risk	The government can provide subordinate loans to ensure enough revenues in order to pay senior-level debt.

Source: *SCT, 2006.*

New concession projects can cover a maximum period of 30 years.

The *PPS* is a kind of concession contract where the private sector is expected to design, finance, build, maintain and operate a toll-free road. The project scheme is mostly used to modernise existing roads that need major structural and/or geometric improvements.

Through a bidding process, the government associates with a private company during a period of 15 to 30 years. The contract goes to the bidder that asks for the smallest net present value of government contributions. Payments to the service provider are made every three months and the amount of money is assigned according to road availability and usage (traffic).

Every bidder estimates the periodic payment according to construction, maintenance and operation costs, interest rates on loans, annual traffic forecasted within a specific band, and the project's life span. The bidding process then selects a pool of technical experts considered to have satisfied legal and financial criteria.

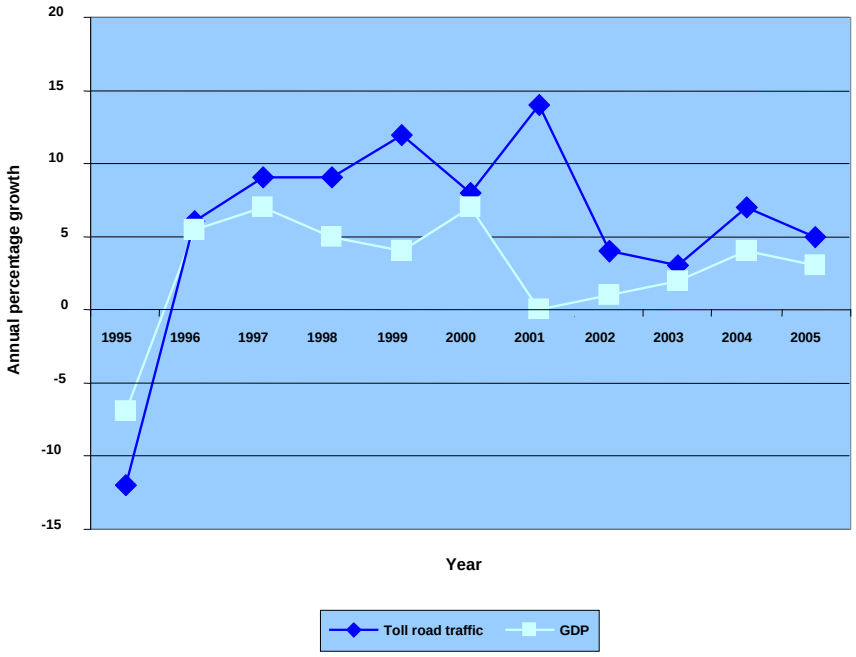
Under the New Concessions model, seven projects existed as of autumn 2006, worth USD 1.3 billion, and a further 10 were in preparation, worth a further USD 1.2 billion, including two international bridges (Standard & Poor's, 2006). Under the PPS scheme, two projects are under construction, worth USD 475 million, and a further 5 projects are in the pipeline, worth USD 1.6 billion. For the most part, these projects benefit from high credit ratings (Standard & Poor's, 2006). Participants in these projects involve companies from Brazil, France, Mexico and Spain.

Figure A.5 reveals steady growth in toll road traffic over recent years, although there also appears to be a (albeit imperfect) link with GDP growth.

Mexico provides an example of a concerted programme for providing infrastructure upgrading via PPPs, where earlier lessons led to specific changes in the structure for designing and implementing these arrangements.

Figure A.5. **GDP and Toll Road Traffic Growth**

Mexico, 1995-2005



Source: Standard & Poor's, 2006.

2.7. Rail link financing in Sweden

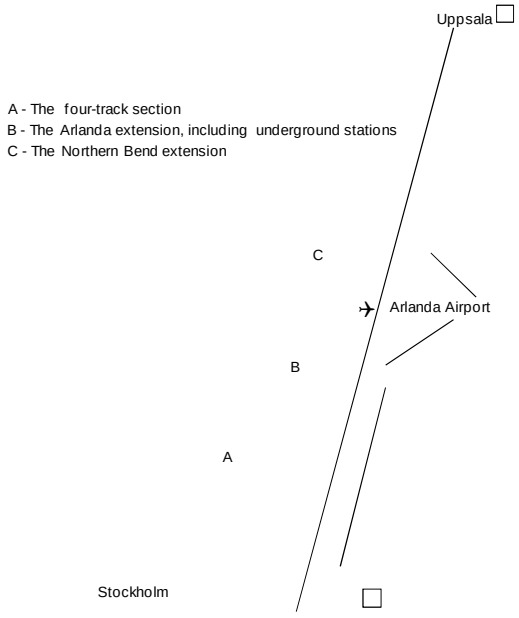
The Arlanda Airport rail link in Sweden gives an example of PPP financing in the rail sector. It illustrates how changes in the external context of an arrangement can affect demand, and therefore outcomes for the parties involved. Furthermore, it shows how government can support such models by way of innovative financing instruments. Finally, it provides an overview of how questions of pricing policy can impact on a PPP's overall usage, as well as that of other concurrent services.

Arlanda, Sweden's most important international airport, is situated half-way between Stockholm and Uppsala, where a 75-kilometre double-track rail line has long since connected the cities. The old line is about 3 kilometres from the airport. Prior to the Arlanda link project, public transport between Stockholm and the airport (42 kilometres) was only provided by a shuttle bus.

Figure A.6 describes the Arlanda project. Previously, track capacity on section A was constrained. Therefore, to make it feasible to operate a dedicated airport service it was necessary to have another two tracks built on this section.

The section linking the airport to the original tracks from the south, including a station at the airport (section B in Figure A.6), is the core of the Arlanda project. A third component is "the Northern Bend", linking Arlanda to the main line to the north (section C).

Figure A.6. **Schematic Diagram of the Primary Components of the Arlanda Airport Rail Link**



In early 1993, the *Riksdagen* (parliament) took a framework decision to have the four-track and the Northern Bend sections *(i.e.* sections A and C) built and paid from the government's budget.

Four consortia participated in the last round of the procurement process. The Arlanda Link Consortium was identified as the preferred bidder in July 1994, and the contract was signed in August. The consortium comprised the Swedish construction companies NCC and SIAB, which undertook all construction works, and *Vattenfall,* Sweden's leading electricity utility. A fourth owner was GEC Alstom, a European railway equipment supplier, which built the trains that operate on the line. Fifth, John Mowlem, a British construction company with experience in railway construction, supplied tracks and switches, as well as signalling and telecom systems. None of these companies seems to have had prior experience operating railway services.

The private consortium subsequently established itself as a special purpose vehicle, A-Train. Services were opened in November 1999 and are marketed as the Arlanda Express.

The Arlanda link investment is a BOT agreement between Sweden's government and the private consortium. In return for private money that pays for parts of the investment costs, the consortium is given the right to charge shuttle passengers for a 45-year period, with an option for a 10-year extension.

The contract was designed to provide for efficiency in construction and service supply. The design of the contract made the winning consortium trade off investment against maintenance costs, meaning that A-Train could design and build links B and C in the way it found fit. It did, at the same time, have to accept all risks related to cost overruns during both the construction phase and subsequent operations. The consortium would only be compensated for cost overruns induced by new ordinances or laws with direct bearing on the project, or if unplanned archaeological excavations had to be made. Moreover, the consortium had to shoulder the full market risk, meaning that it would have to bear any below-target revenue due to slumps in air travel.

The following core components of the arrangement were established by the *Riksdagen's* June 1994 decision. First, the state pledged to make an up-front payment for the Northern Bend (section C) and for at least 50% of the costs for connecting sections B and C to the main line. Second, the consortium committed itself (a) to contributing with at least SEK 0.6 billion or 15% of the total project cost in the form of share capital, and (b) to raising at least 75% of total costs for link B on commercial terms from outside the government budget.

Third, the remaining construction costs were to be provided by a "conditional loan" from the government. This SEK 1 billion loan granted to A-Train was channelled through the National Debt Office. The repayment is deliberately skewed towards the later part of the contract's life period. It was obvious to the government's working group that the debt burden would be substantial during the first years of operations, while the surplus could become huge towards the end of the contract period when much of the debt will have been paid off. The agreement was therefore to let *Banverket* (the public authority with responsibility for the rail network) pay the interest on the conditional loan to the Debt Office. The concessionaire, in turn, would not have to compensate *Banverket* for this debt until after external loans had been repaid and the owners had received their dividends. If all outstanding debt was repaid before the termination of the contract, *Banverket* would also be compensated for the interest paid to the Debt Office.

The conditional loan thus has lower priority than A-Train's other debt, and the state has no securities for it. Since risk capital will not be paid back until this loan has been repaid, it streamlines the interests of the government and the concessionaire. It also caps the size of the profits of the concessionaire. Importantly, there are no loan guarantees given for the rest of the debt.

It is important to emphasize that the government realised the trade-off between the size of this loan and the degree of monopoly control delegated to the winning consortium. Restrictions on competing bus services might, for instance, have substantially reduced the necessity to provide a loan on soft conditions.

A fourth contractual component was A-Train's commitment to operate at least 4 trains per hour and direction between the airport and Stockholm during most of the day. The consortium was, in addition, given property rights for 6 time slots per hour on the main line. Except for its share of investment costs, it was also to pay for rolling stock and its maintenance, as well as the maintenance costs for sections B and C of the infrastructure investment. Furthermore, it was compelled to let long-distance trains use the tracks, but it was given an open mandate to charge for this use.

Investment costs ex ante and ex post

The best estimate is that total costs for sections A-C and the purchase of rolling stock by the early 1990s were expected to be about SEK 6 billion. Of this sum, the private consortium would be responsible for investment in section B, calculated to cost SEK 2.6 billion, out of which SEK 1 billion was paid for by the guaranteed loan (see Table A.4). The table indicates that section A, built under *Banverket's* auspices, saw a cost overrun of about 25%. Except for that, and with some qualifications, the *ex ante* estimates do not seem to be far off the actual outcome.

To summarise, the core (infrastructure) cost component of the Arlanda contract footed by the private partner was about SEK 2.7 billion, out of which SEK 1 billion was a government loan. The consortium borrowed another SEK 1.1 billion from banks, its share capital was SEK 400 million and, in addition, its partners gave a loan of SEK 200 million. Except for that, rolling stock was leased on a contract costing about SEK 700 million. The deal has reduced the need to raise tax revenue or sell bonds by SEK 1.7 billion in return for a project opened on time. On top of this, the government has a non-secured claim of SEK 1 billion from the consortium.

Table A.4. ***Ex Ante* and *Ex Post* Costs for the Arlanda Link Project**

Million SEK (year of estimate)

Section	Ex ante (1992)	Ex post (1999)
A	1 900	2 400
B	2 600	2 700
C	850	850
Rolling stock	600	850

Financial aspects of the airport link

A-Train's financial result was poor during its first years, but the Annual Report for 2005 demonstrated a small surplus. The big problem is on the revenue side, compared to expectations. Total income from an airport link service is calculated by the number of passengers times unit price. The number of airport employees and, in particular, of airline passengers is therefore a crucial variable.

One reason for the revenue problems was that the official forecast for year 2000 overestimated use by close to 20%. After traffic was initiated, events beyond the control of the operator have had obvious consequences. The combined effects of an economic downturn in year 2000, the terrorist attack on 11 September 2001, and the SARS epidemic greatly reduced subsequent total travel, in Sweden as in most countries, with consequences for the train shuttle's market.

Changes in the domestic transport market after the contract was signed in 1994 have also affected results. There are now three other airports in the greater Stockholm area, which, taken together, compete both for domestic and international air traffic; in the early 1990s there was only one domestic competitor. The motorway between Arlanda and downtown Stockholm has been upgraded, including a much higher capacity at the airport approaches. The airport agency has also expanded affordable parking capacity at the airport, further promoting the competitive edge of private cars.

An additional reason for the discrepancy between projections and actual patronage is A-Train's high-price policy, meaning that the service particularly attracts business passengers. An early cost-benefit analysis assumed a price on par with coaches and that coaches would be virtually eliminated; however, today's competition between train and coach is fierce.

A-Train's competitive strategy should also be considered from a strategic perspective. Coaches are today operated as a profitable commercial enterprise. Their policy seems to be to charge half the price for using the train; during spring 2006, it cost SEK 90 for a 40-minute travel time by bus, versus SEK 200 for 20 minutes by train. At the same time, taxis charge SEK 475 for a travel time of about 30 minutes. There thus appears to be an oligopolistic market situation with strong interaction between the different modes and their pricing and supply strategies.

The contract between A-Track and A-Train leaves all revenue risk with the operator. It may be difficult to control for business risk due to external demand variations and it is not straightforward to assess price elasticities in different market segments in order to design profit-maximising multi-part tariffs. Irrespective of that, A-Train was well aware of the market risk when it submitted its original bid and signed the subsequent contracts. The company's ability to attract a large enough patronage, and to counter the consequences that external events have had for patronage, has obviously not been sufficient to make projections hold. Considering the extreme external events that have severely affected the venture it is, however, perhaps more surprising that it has turned deficits into a small surplus some five years after commencing traffic.

In January, 2004, the Macquarie Group acquired all shares in A-Train, plus its outstanding debt, at a cost of SEK 400 million. The change of ownership means that the railway services to Arlanda Airport are now operated by an owner with deep insights into the appropriate management of this sort of activity, a quality not provided by the partners of the original consortium. There are reasons to make the same firm control both construction and maintenance of infrastructure in order to optimise life-cycle costs (Martimort and Pouyet, 2005). This link is not broken by the sale, since the value of the facilities at the time of sale is obviously related to the appropriate trade-offs that are made during the construction phase (see also Dewatripont and Legros, 2005, for an analysis of the pros and cons of participation in PPP projects by third party expert creditors).

Economic aspects of the service

The agreement signed with the government gave A-Train control over the way in which tunnels were constructed, as well as over the conditions for giving long-distance services access to Arlanda. A-Train charges other operators for using the facilities. While information on this account is confidential, long-distance trains seem to pay a charge for each stopping train plus a certain amount for each arriving and departing passenger. In this way, A-Train gets additional revenue and, in particular, it blocks the risk that long-distance operators might charge a lower price than A-Train for Arlanda-Stockholm trips, thus undermining its demand.

Legislation in 1994 acknowledged that this construction is harmful for competition. To the extent that passengers and/or operators are scared off by charges above marginal costs, it would result in a direct loss of allocative efficiency. A-Train's monopoly control over access to Arlanda station was, however, seen as a price that had to be paid for attracting private money into the project.

A-Train's monopoly franchise may be particularly harmful for many potential passengers living within about 100 kilometres of the airport. For this market segment, a rail service for trips to and from the airport today requires a change of trains at Stockholm's central station. The extra inconvenience and the non-existence of inter-ticketing, in combination with the high price for the rail link, makes the car retain its competitive edge.

In addition, the Stockholm region's commuter train services have not been extended to the airport, even though they would not be in direct competition with A-Train's services in view of their frequent stops and consequent longer travel time. Commuter trains might, on the other hand, attract many of today's car users.

The high price for using the shuttle, the charges for other operators that want to use the Arlanda station, and the lack of interest in promoting complementary commuter train services, have meant that the airport line has not been integrated into the overall network in the way intended in the political decision, at least not for local and regional trips. This provides a background for the inability of the new service to take market share from cars and taxis.

Concluding remarks

The Arlanda case reveals the complexity of a PPP project, and how circumstances can change even shortly after it is created. This case has particularly interesting insights regarding the transfer of demand risk, and the provision of state guarantees.

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The following consulting reports were developed as inputs to this project, all of which are available in their entirety on the Transport Research Centre's web site, at www.internationaltransportforum.org/jtrc/index.html

Nils Bruzelius (2005), The Impact of Legal/Regulatory Frameworks on Transaction Costs for Private Sector Involvement in (Transport) Infrastructure Funding.

KPMG (2005), Financial Viability and Affordability of Off-Budget Infrastructure Funding Models.

Virtuosity Consulting (David Stambrook) (2005), Successful Examples of Public-Private Partnerships and Private Sector Involvement in Transport Infrastructure Development.

In addition, working group members provided detailed presentations on themes associated with this project at various international sessions. These are also available on the Transport Research Centre's web site, at www.internationaltransportforum.org/jtrc/index.html

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TRANSPORT INFRASTRUCTURE INVESTMENT

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